EXHIBIT 4

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TEXTRON INNOVATIONS INC.,	)	
	)	
Plaintiff,	)	
	)	
v.	)	**C. A. No. 05-486 (GMS)**
	)	
THE TORO COMPANY,	)	
	)	
Defendant.	)	

DECLARATION OF RICHARD L. PARISH, PHD, PE, IN SUPPORT OF TEXTRON'S PROPOSED CLAIM CONSTRUCTION FOR CERTAIN CLAIM TERMS IN U.S. PATENT NOS. 6,047,530 6,336,311 AND 6,336,312

I, Richard L. Parish, PhD, PE, declare, depose and state the following:

1. I am a Professor of Agricultural Engineering at the Louisiana State University Agricultural Center in Hammond, LA (LSU) and I am a consultant in agricultural engineering. My business address is 21135 Highway 16, Amite, LA 70422. I have been involved in the farm and maintenance machinery field for over thirty-five years. I am a registered Professional Engineer. I am over eighteen years of age and I would otherwise be competent to testify as to the matters set forth herein if I am called upon to do so at trial.

2. I have been retained by Hunton & Williams, L.L.P. on behalf of the Plaintiff, Textron Innovations Inc. ("Textron"), as a technical expert witness with respect to the proceedings currently before the Court in the above-captioned matter.

3. For purposes of this Declaration, I have been asked to provide an expert technical analysis as to the proper interpretation of certain terms in the claims of U.S. Patent No. 6,047,530 (the "'530 patent"), U.S. Patent No. 6,336,311 (the "'311 patent") and U.S. Patent No.

6,336,312 (the "'312 patent") (collectively the "Textron patents").

I. BACKGROUND AND EXPERIENCE

4. In terms of my background and experiences that qualify me as an expert in this case, I earned a Ph.D. in Agricultural Engineering in 1970 from the University of Missouri. I also obtained a Master of Science Degree in Agricultural Engineering from the University of Missouri in 1968 and a Bachelor of Science Degree in Agricultural Engineering from the University of Missouri in 1967.

5. I have authored or co-authored 119 refereed articles on various topics related to agricultural equipment, grounds maintenance equipment and applications thereof, among other topics.

6. In addition, I have published over 30 Abstracts related to agricultural engineering and horticulture. Furthermore, I have presented at least 60 papers at various American Society of Agricultural Engineers meetings. These papers have been variously directed to steering systems for hydrostatic vehicles, vertical-plate planters, machinery systems for cotton production, granular applicators, and sprayers, among a variety of other topics. In addition, I have delivered numerous presentations at meetings involving agricultural engineering and equipment issues. There are many other non-refereed publications that I have authored which are too numerous to mention here but are listed on my *curriculum vitae* (Exh. 1). In addition to the items specifically listed on my CV, I have published over 200 extension articles on equipment on the LSU AgCenter website.

7. I have been awarded three patents, two in the United States and one in Canada. one of my U.S. patents, U.S. Patent No. 4,153,184 is entitled "Manually Operated Applicator Having a Plurality of Rotors for Dispensing Particulate Material." The other, U.S. Patent D254,591, is entitled "Combined Fertilizer and Pesticide Applicator for Plants." My Canadian

patent (1,085,792) is directed to an applicator for particulate material.

8. I am a member of the American Society of Agricultural and Biological Engineers (ASABE), formerly the American Society of Agricultural Engineers (ASAE).

9. I have been a guest lecturer at meetings sponsored by various organizations around the country.

10. In addition to my research and extension activities at the LSU AgCenter, I am the Interim Resident Coordinator of the LSU AgCenter's Citrus Research Station, an agricultural experiment station.

11. I have also had the opportunity to consult with and/or work in the commercial sector. For example, I have received research grants from Bayer, The Scotts Company, The Andersons, DuPont, Spyker Spreaders, Monsanto, NuGro, Novozymes, and other companies to perform studies on agricultural engineering and grounds maintenance equipment. In the past, I have consulted for The Scotts Company, Lesco, Dickey Machine Works, Amco, and Grace Sierra. I also managed the Mechanical Research & Development Department for O.M. Scott and Sons Company.

12. I was qualified by the United States District Court for the Southern District of Illinois as an expert witness in the field of turf maintenance equipment in the patent infringement matter of *Deere & Co. v. Kubota*, Civil Action No. 99-4026, which case was tried before a jury in Peoria, IL. I was retained by the accused infringer, Kubota. That action involved Deere's allegations that Kubota's mower attachment mechanism infringed the claims of the Deere patent-in-suit. Based in part on my testimony, the jury found all of the asserted claims to be non-infringed and some of the asserted claims were found to be invalid.

13. I have also been qualified as an expert in the field of agricultural engineering and

grounds maintenance equipment in numerous personal injury, product liability and product performance disputes. These matters generally involve agricultural equipment, lawn and garden equipment, grounds maintenance equipment and forestry equipment.

14. I have developed or supervised the development of guidance systems for hydrostatic vehicles, vertical-plate planters, self-propelled cotton stripers, folding lawn carts, fertilizer spreaders and harvest wagons, among others.

15. As for my professional and service activities, I am the Machinery Consulting Editor for *Journal of Vegetable Crop Production* (1992-present). In addition, I was the Associate Editor for vegetable and fruit production engineering for the *Transactions of ASAE* and *Applied Engineering in Agriculture* (1998-2003). For more than 30 years I have served on various committees of the American Society of Agricultural Engineers. Among others, I have been actively involved in the Power and Machinery Division where I have served on the Steering Committee, Publications Committee, Technical Coordinating Committee and Program Committee. I have also served as a reviewer of articles for a host of publications, including *Applied Engineering and Agriculture*, and *Transactions of ASAE*, *HortTechnology*, among others.

16. I have developed and or taught a variety of agricultural engineering courses at LSU. For example, I developed and taught AGE 1248 – Production Machinery in Agriculture, which is a general introductory course covering all areas of agricultural engineering. Another is AGE 7305 – Advanced Power and Machinery, a graduate-level course, which emphasizes practical machine design considerations.

17. My fields of expertise include agricultural engineering, including vehicles used in agricultural engineering, such as tractors, mowers and the like.

18. A detailed *curriculum vitae* showing more of my credentials in this field is attached as Exhibit 1.

II. MATERIALS REVIEWED

19. In performing the analysis that is the subject of the Declaration, I have reviewed the '530 patent and its prosecution history, the '311 patent and its prosecution history, and the '312 patent and its prosecution history. I have also reviewed the prior art cited in the '530 patent, the '311 patent and the '312 patent, and I have reviewed the Defendant's proposed constructions of certain claim terms.

III. UNDERSTANDING OF LAW TO BE APPLIED TO INTERPRET CLAIMS

20. In formulating my opinions and conclusions in this case, I have been provided with an understanding of the prevailing principles of U.S. patent law that govern the issues of patent claim interpretation.

21. As a result, I understand that it is a basic principle of patent law that before analyzing the infringement or validity of a patent claim, the claim language must be properly construed to determine its scope and meaning.

22. In performing my analysis of the proper interpretation to be given to the claims of the patents-in-suit, I have followed the Supreme Court's teaching in *Markman v. Westview Instruments*. I understand that *Markman* provides that when construing the terms of a patent claim, I should first look to the "intrinsic evidence" for their meaning, starting with the language of the claims themselves. As an initial matter, claim terms should be given their ordinary and customary meaning to a person of ordinary skill in the art.

23. In addition, I understand that if a term used in a claim has a plain and ordinary meaning on its face, I am not to construe any special meaning for that claim term unless the

patentee provided a special meaning in the patent.

24. Moreover, because claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims.

25. Differences among claims can also be a useful guide in understanding the meaning of particular claim terms. For example, the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.

26. I further understand that I may also consult the patent specification and drawings in formulating the proper construction to be accorded to particular claim terms since the patent claims should be read in view of the specification of which they are a part.

27. Moreover, the specification may reveal that the inventor gave a special definition to a claim term which differs from the ordinary and customary meaning of such terms, in which case, the inventor's lexicography governs. In other cases, the specification may reveal an intentional disavowal of claim scope by the inventor and, in such cases, the inventor's intention also governs.

28. However, it is my understanding that it is improper to limit the claims to specific embodiments described in the specification or to import limitations from the specification into the claims. That is because the claim terms mean what they say to a person of ordinary skill in the art, and it is improper to look first to the embodiments in the specification to interpret the terms of the claims. Moreover, I further understand that it is improper to limit the scope of the claims to the specific embodiments disclosed in the specification even if only one embodiment is described. This is because the specification does not delimit the patent owner's legal rights.

That is the function and purpose of the claims.

29. I also understand that when a patent claim uses the term "comprising" in the transitional phrase, that is, the phrase connecting the preamble to the body of the claim, the claim is interpreted such that the named elements are essential, but other elements may be added and still form a device within the scope of the claim.

30. In addition to consulting the specification, I understand that the prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the scope of the invention during prosecution, thereby making the claim scope narrower than it would otherwise be understood by a person of ordinary skill in the art. However, because the prosecution history represents an ongoing negotiation between the Patent Office and the inventor, rather than the final product of the negotiation which is the issued patent, it lacks the clarity of the specification and is therefore less useful for claim construction purposes.

31. I further understand that extrinsic evidence such as inventor testimony, dictionaries and learned treatises are less reliable than the intrinsic record in determining the meaning of claim language because such evidence often focuses the inquiry on the abstract meaning of the terms rather than on the meaning of such terms in the proper context of the claims and patent specification. Such evidence, however, may be useful to confirm that the inventor used a claim term in a manner consistent with its customary and ordinary meaning to persons of ordinary skill in the art.

IV. PERSON OF ORDINARY SKILL IN THE ART

32. It is my understanding that my analysis of the interpretation of the asserted claims of the patents-in-suit must be undertaken from the perspective of what would have been known or understood by someone of ordinary skill in the art of the patents-in-suit. From analyzing these

patents (which share a common specification, except the '312 patent which has additional disclosure due to it being a continuation in part of the '311 patent), it is my opinion that they are directed to a person in the field of design of turf maintenance equipment with a Bachelor of Science degree in Agricultural or Mechanical Engineering and some practical engineering design experience involving agricultural or grounds maintenance equipment, perhaps about a year or two of experience, and having an understanding of basic principles of turf maintenance machinery in the 1997 to 2000 time frame when the inventors of the inventions claimed in the patents-in-suit conceived their inventions and reduced them to practice. With thirty nine years of experience in the agricultural engineering field, I am well acquainted with the level of ordinary skill required to design turf maintenance machinery. I have direct experience with engineering design and with turf equipment, and am capable of rendering an informed opinion on what the level of ordinary skill in the art was for such engineers in 1997-2000.

33. The level of technical specificity provided in the patent specification would have been sufficient for a person with a Bachelor of Science in Agricultural or Mechanical Engineering with some practical design experience or others of ordinary skill in the art at the time of the inventions to build and implement the mowers claimed in the patents-in-suit. Therefore, my analysis of the proper meaning of the terms and phrases used in the claims of the patents-in-suit will be undertaken from this perspective.

V. PROPER INTERPRETATION OF THE CLAIM TERMS AT ISSUE

34. In my opinion, the terms used in the claims of the patents-in-suit are not words of special or uncommon meaning, are readily understood by persons of ordinary skill in the art and do not require construction beyond their plain and ordinary meanings.

"Gang-Type Rotary Lawn Mower"

35. In my opinion, this phrase is a limitation of the claims and should be accorded its

ordinary meaning. It is described in the specification as being critical to the invention, it was relied upon to distinguish the claims at issue over the prior art, and it provides antecedent basis form claim recitations outside the preamble. The Textron patents describe various types of mowers, such as reel mowers and tow-behind gang mowers, which were understood to be unsuitable or undesirable for certain mowing operations. *See* '530 patent at 1:6-20. The Textron patents describe the invention in the context of gang-type rotary mowers having multiple separate rotary cutting decks attached to the frame, as opposed to being towed behind the vehicle. *Id*. at 1:4-5, 1:38-44, 2:64-5, ; and Fig. 1. During prosecution, this distinction was important to overcoming various prior art references. For example, in the Amendment filed April 29, 1999 (Paper no. 11), the Applicant distinguished the claims at issue over tow-behind gang mowers, reel mowers, and walk behind mowers based in part on the fact that the invention claimed a frame-mounted gang of rotary cutting decks. *See* Amendment of Apr. 29, 1999 at 5-6 (Paper no. 11) at 5-6 ("Claim 1 has been amended to emphasize the fact that Applicant's invention is a frame-mounted, gang-type, single-blade rotary deck mower…"; *see also*, Amendment of Nov. 4, 1999 (Paper no. 15) at 1-2; *and* Declaration Under Rule 132 dated Nov. 4, 1999 (Paper no. 14) at ¶ 4.

36. Furthermore, "gang-type rotary lawn mower" provides antecedence for claim terms that follow. *See*, *e.g.*, '530 patent, Claim 1 ("A gang-type rotary lawn mower comprising … a steering system enabling the operator to steer *the lawn mower*…")(emphasis added); '311 patent, Claims 1, 2 and 10; *and* '312 patent, Claims 1 and 24. This is particularly true for '312 patent Claim 19, which recites "[a] cutting deck assembly for *a gang-type rotary lawn mower having a frame*, the cutting deck assembly comprising: … a lifting arm adapted to pivotally interconnect said cutting deck assembly *and the frame*." '312 patent at 9:32-10:5 (Claim 19).

Without the preamble's recitation of the gang-type rotary lawn mower and its frame, the lifting arm element would not have antecedent basis for its attachment to the frame.

37. I understand that Toro contends that because "each claim provides for a mower that has multiple decks … the claim limitations explicitly define a 'gang type' mower with blades rotating on a vertical spindle." I respectfully disagree. Toro's interpretation completely eliminates the "gang-type" limitation. Gang-type rotary mowers have multiple independent rotary cutting deck assemblies. Toro's interpretation would appear to cover a conventional non-gang rotary mower having a single cutting deck with two rotary cutters, but no other cutting decks. This would not be a gang-type mower, because it would not have multiple decks.

"Front and Rear Wheels"

38. In my opinion, this term has a plain and ordinary meaning. The word "wheels" indicates that there are at least two wheels. The use of the words "front" and "rear" indicates that the claimed "wheels" must be located at the front and rear of the vehicle. Because there are at least two wheels, and because they must be located at the front and the rear of the vehicle, there must be at least one front wheel, and at least one rear wheel.

39. This interpretation is supported by the specification. For example, the '530 patent discloses an embodiment of the invention having a frame (12) supported by two front wheels (14) and two rear wheels (16). 530 patent 2:45-48, and Fig. 1.

40. I understand that Toro seeks to construe "front and rear wheels" to mean "[a]t least two front wheels and at least two rear wheels." But claim 2 of the '530 patent, which further limits claim 1, recites that there are "rear wheels." Claim 2 would be redundant if claim 1 was already limited to more than one rear wheel. I also understand that Toro cites to claim 1 of the '312 patent, which recites "a frame supported by front wheels and at least one rear wheel."

However, this claim is drafted differently from the '530 patent claim 1, and thus has a different scope. Specifically, simply because claim 1 of the '312 patent is recited more narrowly than "front and rear wheels" does not change the plain and ordinary meaning of "front and rear wheels."

"Rotary Cutting Deck Assembly"

41. In my opinion, the Textron patents use the term "rotary cutting deck assembly" according to its ordinary and accustomed meaning in the art — namely, to describe a cutting deck assembly that has a rotary blade, as distinguished from a reel blade. This is consistent with the use of the term in the Textron patents, which all describe cutting deck assemblies that have "rotary" blades that rotate in a plane and about a generally vertical axis, as opposed to "reel" blades, which rotate in a cylindrical manner and about a generally horizontal axis. *See, e.g.,* '530 patent at 1:4-5, 1:6-20 (distinguishing invention from reel mowers), 1:22-56, 3:45-65; and Figs. 2-6 (showing cutting deck assembly with blade sets (92, 96) that rotate about generally vertical axes to form disk-like cutting planes). This distinction is abundantly clear to those of ordinary skill in the art. Furthermore, I observe that this distinction was recognized throughout the prosecution of the patents in suit. *See, e.g.*, Office Action of Apr. 13, 1998 (Paper no. 4) at 5 (Examiner acknowledging distinction between reel and rotary cutters); Office Action of Jan. 29, 1999 (Paper no. 10) at 2-3 (same); and Amendment of Nov. 4, 1999 (Paper no. 15) at 2 (Applicant distinguishing claimed rotary mower from reel mowers).

42. While Toro does not appear to disagree that the term "rotary cutting deck assembly" requires rotary-type cutting devices, as opposed to reel-type cutting devices, Toro contends that this term includes a host of other limitations, some of which are redundant (and thus, unnecessary), and some of which improperly limit the patent claims to unclaimed features

of the exemplary embodiments of the invention. Namely, Toro seeks to interpret this term to mean "a cutting unit having laterally-spaced, generally vertically-extending side plates, a cross member, front wheels supporting the side plates, a rear roller extending between and supporting the side plates, and a single spindle rotary deck mounted between the side plates." A person of ordinary skill in the art would not read these additional limitations into the term "rotary cutting deck assembly." Furthermore, "laterally-spaced, generally vertically-extending side plates"; "front wheels supporting the side plates," and a "rear roller extending between and supporting the side plates" actually appear in various dependent claims. *See, e.g.*, '530 patent at 5:10-22 (Claim 4); *and* '311 patent at 5:23-35 (Claim 4), and 6:39-51 (Claim 12).

43. Toro's claim that the term "rotary cutting deck assembly" also requires the deck assembly to be a "single spindle rotary deck" also renders other claim terms within the independent claims redundant. '530 patent claim 1 and '311 patent claim 1 both specifically recite that the "rotary cutting deck assemblies" comprise a "single-spindle cutting deck" separate and apart from the recitation of the "rotary cutting deck assembly." Thus, if the term "rotary cutting deck assembly" already includes the "single spindle" imported limitation as Toro advocates, the separate specific recitation of the "single spindle" feature would be superfluous. Furthermore, the "single spindle" requirement does not even appear in '311 patent claims 2 and 10, or '312 patent claims 1 and 24. Instead, these claims recite "at least one cutting blade mounted on a spindle," *see, e.g.,* '311 patent at 5:13-14, yet these claims say nothing about the number of spindles. Thus, Toro's proposed construction is finds no support in the actual claim terms used to describe the invention.

44. Toro's proposed interpretation also attempts to import the "cross member" feature of the exemplary embodiments into the claims. The "cross member" is described in the

specification as a part (128) that is used to mount the cutting deck assemblies to the vehicle frame. *See, e.g.,* '530 patent at 1:62-2:3, 4:7-19, and Figs. 2, 3 and 5. While the "cross member" is described in the specifications, it is not recited in any of the claims at issue, and thus does not limit the claims at issue. In fact, if the "cross member" feature was intended to be a limitation of the claims at issue, it would have been written into the claims just as it was written in to various unasserted claims of the '530 patent. *See, e.g.,* '530 patent at 5:62-6:17 (unasserted claim 7 reciting that the "front and rear deck assemblies" are mounted to the frame in part by a "cross member"). The fact that this element is written into various unasserted claims, but not the claims presently asserted against Toro, demonstrates that the claims at issue do not include this limitation.

"Mounted On The Frame"

45. In my opinion, this term is used in accordance with its ordinary and accustomed meaning. For example, the '530 patent describes and claims that a power source, an operator's seat, and front and rear cutting deck assemblies are all "mounted on the frame":

> A gang-type rotary lawn mower including … a power source which is *mounted on the frame* … an operator's seat *mounted on the frame* … front rotary cutting deck assemblies *mounted on the frame* … rear rotary cutting deck assembly *mounted on the frame*….

'530 patent, Abstract (emphasis added), and 1:38-44. The specification illustrates the power source (18) and operators seat (20) being joined directly to the frame (*i.e.*, without any intervening parts). *See* '530 patent, Fig. 1, and 2:52-63. The power source and operator's seat are also specifically *claimed* as being "mounted on the frame." *See, e.g.,* '530 patent at 4:44 ("a power source which is mounted on the frame"), and 4:46 ("an operator's seat mounted on the frame"). While the specific details of how the power source and operator's seat are not detailed in the Textron Patents, such details would be well understood by a person of ordinary skill in the

art, and therefore are not required in the specification to enable a person of ordinary skill in the art to practice the invention. For example, power sources are typically mounted to the frame by rigid or elastic bushings, and operator's seats are often attached directly to the frame or a body panel fitted to the frame, by direct attachment or by one or more shock-absorbing springs.

46. In contrast, the front and rear cutting deck assemblies (34) are described and illustrated as being "mounted on the frame" by way of "lifting arms" (112). *See* '530 patent at 1:34-37, 1:57-65, 3:66-4:11, and Figs. 1-5. The independent claims do not require the lifting arm feature, but various dependent claims do. *See, e.g.,* '530 patent at 5:5-9 (dependent claim 3) ("A lawn mower as set forth in claim 1 wherein each deck assembly is *connected to the frame by a respective lifting arm* operable to lift the associated deck assembly relative to the frame") (emphasis added); '311 patent at 5:18-22 (dependent claim 3), and 6:34-38 (dependent claim 11); *and* '312 patent at 9:17-22 (dependent claim 14). In the exemplary embodiment shown in the '530 and '311 patents, each deck assembly has its own lifting arm, and the lifting arms are configured to lift the decks assemblies relative to the frame, and allow pivoting movement about three mutually perpendicular axes. *Id.* The '312 patent also discloses an embodiment in which the lifting arms are configured to lift the decks relative to the frame, but only allow pivoting about perpendicular horizontal axes, and not about the vertical axis. *See* '312 patent at 5:66-6:19, and Figs. 9 and 10.

47. The Textron patents also use the phrase "mounted on" to describe and claim various other connections between parts. For example, the '530 patent describes, illustrates, and claims cutting blades "mounted on the spindle for rotation therewith." '530 patent Abstract, 3:51-52, 4:62-64 (claim 1), and Fig. 4. The cutting blades are rigidly fixed to the rotating spindle, and therefore "mounted on" is used to describe a rigid connection between parts. In

addition, the '530 patent describes the cutting deck assemblies as having a cutting deck "mounted on the side plates 46 and 48 such that the height of the deck 38 relative to the ground is adjustable." '530 patent at 3:22-24, 1:50-54, and Figs. 2-6. The '530 patent claims this arrangement in dependent claim 4. *See* '530 patent at 5:10-22 ("…the associated deck is located between the side plates and in front of the roller and is mounted on the side plates such that the height of the deck relative to the ground is adjustable…") (emphasis added). As such, the term "mounted on" is also used to describe parts that are connected such that they can be moved or repositioned relative to one another.

48. As can be seen from the foregoing examples, the term "mounted on the frame" and "mounted on" are used to describe various different manners of connecting parts together. The power source and operator's seat are "mounted on the frame" by a direct connection, as known in the art, and shown in Figure 1 of the '530 patent. The cutting deck assemblies are "mounted on the frame" in the exemplary embodiment by way of a lifting arm. The cutting blades are fixedly "mounted on" rotating spindles. The cutting deck assemblies are "mounted on" the side plates to allow vertical adjustment. Furthermore, the patent claims themselves use the term "mounted on the frame" and "mounted on" to describe associations between various different elements of the claimed invention. One of ordinary skill in the art would understand that "mounted on the frame" is used in the specification and claims in a broad sense to convey that the part "mounted on the frame" is simply connected to the frame in some manner.

49. While the Textron patents clearly use the term "mounted on the frame" in a broad sense to convey a connection between parts, I understand that Toro suggests a much narrower interpretation, namely "attached directly to the frame so that the deck can move vertically relative to the frame and can pivot relative to the frame about three mutually perpendicular

axes." Toro's proposed construction is at odds with how this term is used in the specification and claims. For example, the power source and operator's seat are also described and claimed as being "mounted on the frame." Under Toro's proposed interpretation, the "power source" and "operator's seat" of '530 patent claim 1 must be able to "move vertically relative to the frame and can pivot relative to the frame about three mutually perpendicular axes." Clearly this is not the case. Toro's construction also fails to comport with how the term "mounted on" is used to describe the connection between other parts, such as the cutting blades being fixedly "mounted on" rotating spindles and the cutting deck assemblies being "mounted on" the side plates to allow vertical adjustment, but not relative pivoting movement.

50. Furthermore, unasserted claim 7 of the '530 patent recites that the cutting deck assemblies are "mounted on the frame," '530 patent at 5:47-48, and 5:51-52, then further recites that the deck assemblies are mounted with structure to provide pivotal movement about "a generally vertical axis," "a generally horizontal axis extending in the forward-rearward direction," and "a generally horizontal, laterally-extending axis" — that is, about three mutually perpendicular axes. *Id*. at 5:62-6:16. Because Toro's interpretation of "mounted on the frame" would already require these three pivoting relationships, the portions of claim 7 that recite pivotal movement about the three perpendicular axes would be superfluous and unnecessary.

"Deck Defining A Downwardly Opening Space"

51. In my opinion, this term is used consistently with its ordinary and accustomed meaning. For example, the patent specifications disclose "each of the cutting deck assemblies 34 includes (see FIGS. 2-5) a single spindle mulching deck 38 defining a downwardly opening space 42 (FIG. 4)." '530 patent at 3:6-8; *see also* '530 patent at 3:45-47 ("A single spindle 84 (FIG. 4) is mounted for rotation about a generally vertical axis within the space 42 defined by the

deck 38."), and Figs. 2-4; *and* '312 patent at 5:48-50.

52. In contrast, Toro seeks to interpret this simple term to mean "[a] deck defined by a continuous solid vertical wall of uniform height open at the bottom." Toro's proposed construction adds a number of extraneous limitations to the claim language, such as the requirement of a "solid vertical wall" and the wall being "of uniform height." A person of ordinary skill in the art would not understand the term "deck defining a downwardly opening space" to require these limitations. The patent specifications do not use Toro's proposed interpretation to describe the decks. In fact, I observe that the words "solid" and "uniform" do not appear in any of the patents in suit, and the word "continuous" appears only three times in the '312 patent to describe a continuous roller and a continuous roller stripe. *See* '312 patent at 5:60-65, 7:29-33, and 7:36-38.

"**Roller Extends Across Substantially The Entire Width Of The Deck"**

53. In my opinion, this term should be interpreted in accordance with its ordinary and customary meaning, namely, the roller extends across substantially the entire width of the deck, but is not required to be exactly as wide as the deck. The patent specifications disclose a roller (58) that extends across substantially the entire width of a cutting deck (38). *See, e.g.*, '530 patent at 1:54-56; *id.* at 3:16-21; *id.* at Figs. 2, 3 and 5; '312 patent at 5:60-65 (describing '312 patent Fig. 9). I understand that Toro believes the use of the word "substantially" renders the claims indefinite. I respectfully disagree. Those of ordinary skill in the art at the time of the invention would understand that the '530 patent and '311 patent disclose a roller that extends across the width of the deck to provide a continuous striping effect behind the cutting deck. *See, e.g.*, '530 patent at 1:54-56. Such a person of ordinary skill in the art would further understand that to provide this continuous striping effect, the roller must extend across substantially the

entire width of the deck, but is not required to be exactly as wide as the deck.

"Lifting Arm"

54. In my opinion, "lifting arm" is used in accordance with its ordinary and accustomed meaning. It means "an arm that is operable to lift at least one cutting deck assembly." For example, the '530 patent describes a "lifting arm" that is used to lift the decks vertically relative to the frame. *See* '530 patent at 1:34-37, 1:57-62, 3:66-4:7, 4:20-31, and Figs. 1-5. While the embodiment of the lifting arm shown in the '530 patent is L-shaped and is attached by various pivots, the embodiment is exemplary, *see* '530 patent at 2:25-34, and the claims specifically omit recitation of such features. The '312 patent further describes another exemplary embodiment of a "lifting arm" that lifts the a deck relative to the frame, but this additional embodiment has a different shape and various different mounting and pivoting features than the embodiment of the '530 and '311 patents. *See* '312 patent at 5:66-6:7, 6:13-19, and Figs. 9-10. In addition, '530 patent claim 3 recites simply that the "lifting arm" is "operable to lift the associated deck assembly relative to the frame." '530 patent at 5:5-9.

55. I understand that Toro contends that "lifting arm" means "[a] generally L-shaped, horizontally-extending device having inner and outer ends operable to lift the deck assembly relative to the frame, the inner end pivotally connected to the frame, the outer end pivotally connected to the deck assembly for pivotal movement about a generally vertical axis and about a generally horizontal axis extending in the forward-rearward direction. I respectfully disagree.

56. Toro's proposed construction renders a number of other patent claims, such as '530 patent claim 17, redundant. Claim 17 recites, in relevant part "each of the deck assemblies being connected to the frame by a respective generally L-shaped, horizontally-extending *lifting arm* operable to lift the associated deck assembly relative to the frame." Under Toro's

interpretation, there would be no need to specifically recite that the "lifting arm" of claim 17 is "L-shaped" and "horizontally-extending."

"Side Plates"

57. In my opinion, this term should have its ordinary and accustomed meaning, namely, "plate-like components on each side of the deck assembly." Claim 4 of the '530 patent is exemplary:

> a pair of laterally-spaced, generally vertically-extending side plates having forward ends, a first front wheel supporting one of the side plates for movement over the ground, and a second front wheel supporting the other of the side plates for movement over the ground, wherein the rear roller extends between the side plates and supports the side plates for movement over the ground, wherein the associated deck is located between the side plates and in front of the roller and is mounted on the side plates such that the height of the deck relative to the ground is adjustable by changing the position of the deck relative to the side plates.

'530 patent at 5:11-22. Although the term "side plate" includes a few specific structural features — each "side plate" must be "generally vertically-extending," and each side plate must have a "forward end" — this term is used according to its ordinary and accustomed meaning.

58. This interpretation is consistent with the manner in which the term is used in the specification, and the ordinary and accustomed usage of "side plate." For example, the '530 patent illustrates "side plates" (46 and 48) formed as plate-like components on each side of the deck assembly. *See*, *e.g.*, '530 patent at 1:44-54; 1:65-2:3, 3:8-19, 3:22-44, and Figs. 2, 4 and 6. The center of each side plate is provided with mounts for the deck (38), and extensions of the side plate (not numbered) reach forward to the supporting wheels (50), and backward to the supporting roller (58). *Id.* at Figs. 2, 4 and 6.

59. I understand that Toro seeks to construe "side plates" to mean "thin, flat pieces of metal laterally-spaced and generally vertically-extending from the rear roller to the front

wheels." Toro's requested interpretation is redundant to the extent that it calls for the side plates to be "laterally-spaced' and "generally vertically-extending," but seeks to extend the original claim term by further specifying that the side plates must be generally vertically-extending "from the rear roller to the front wheels."

60. While the exemplary embodiments of the patent specifications show side plates that have extensions that reach to the front wheel and roller, the claims do not recite that the side plates must have a particular shape over a particular distance. Rather, the claims broadly recite that the front wheels and roller "support" the side plates.

61. In my opinion, Toro's proposed construction of "side plate" is also inconsistent with the Textron patent specifications. Toro seeks to restrict the "side plates" to being "flat," but the Textron patents specifically disclose side plate structures that are not flat. For example, the '530 patent side plates include "generally horizontal, inwardly-extending ears 69 and 70," '530 patent at 3:27-31; *see also id.* Figs. 2 and 5. The '312 patent also discloses numerous embodiments of side plates that are not "flat," but instead have pronounced curved or right-angle bends in them. *See, e.g.*, '312 patent Figs. 14-19 and 23.

62. Finally, Toro's proposed construction adds the term "thin." The word "thin" does not appear in the specifications or claims of the Textron patents.

"Rear Roller Extends Between The Side Plates And Supports The Side Plates For Movement Over The Ground"

63. In my opinion, the limitation "rear roller extends between the side plates and supports the side plates for movement over the ground" should be interpreted according to its ordinary and accustomed meaning. The patent specifications and Figures describe and illustrate various embodiments of this feature of the invention, which is generally shown as a rear roller that extends between the cutting deck assembly side plates, and is positioned such that the roller

would support the side plates above the ground. *See, e.g.*, '530 patent at 1:44-56, 3:16-21, and Figs 2, 3 and 5; *and* '312 patent at 5:60-65, 6:20-33, 6:66-7:5, 7:13-21, 7:53-58, 7:59-67, and Figs. 109, 11-20 and 22-23.

64. I understand that Toro seeks to construe this term to mean "[e]ach end of the rear roller is connected to a respective side plate." Toro's proposed construction completely eliminates a specifically recited feature of the claim term: that the roller "supports the side plates for movement over the ground." According to Toro's proposed construction, any roller that is connected at its ends to the side plates would satisfy this limitation, regardless of whether the roller supported the side plates for movement over the ground or not. Toro's proposed construction also adds additional limitation that "each end" of the roller be connected to a side plate. While the embodiments of the invention may disclose that the rollers are connected at their ends to the side plates, I observe that this added limitation is not recited in the claims, and should not be imported into them.

65. Finally, Toro's proposed construction incorporates the term "connected to," which is not recited in the claims. The term "connected to" broadly describes any sort of connection, and is used in the patents in suit in this broad sense to encompass, for example, moveable connections, pivoting connections, direct connections, connections by way of intermediate parts, and so on. *See, e.g.,* '530 patent at 5:5-9 (decks "connected to" the frame by way of moveable lifting arms); *id.* at 6:1-8 (end of the "cross member" being "connected to" the side plates for pivotal movement); *id.* at 5:23-25 (hydraulic motor drivingly "connected to" spindle), and 2:56-57 (hydraulic motors drivingly "connected to" wheels); and *id.* at 5:62-64 (deck assembly "connected to" the frame "in part" by a cross member "connected to" the frame).

"Each Rear Deck Assembly Being Aligned With A Respective Gap Between Adjacent Front Deck Assemblies"

66. In my opinion, this limitation should be interpreted according to its ordinary and accustomed meaning, namely, that the rear deck assemblies are aligned with the gaps between the front deck assemblies. The Textron patents disclose embodiments in which rear decks (30) are aligned with the gaps between adjacent front decks (26). *See, e.g.*, '530 patent Abstract; *id.* at 2:64-3:5; *id.* at Fig. 1; '312 patent at 5:15-22; *id.* at 6:54-65; *and id.* at Figs. 1, 7, 8, 12, and 16-18. As I understand it, the phrase "each rear deck assembly being aligned with a respective gap between adjacent front deck assemblies" modifies and further defines the recitation of "at least one rear rotary cutting deck assembly." Claim 1 of the '530 patent is illustrative:

> *at least one rear rotary cutting deck assembly* mounted on the frame behind the front deck assemblies and between the front and rear wheels, *each rear deck assembly being aligned with a respective gap between adjacent front deck assemblies*,

'530 patent at 4:54-58 (emphasis added). As such, the "rear rotary cutting deck assembl[ies]" are specifically defined as those that are "aligned with a respective gap between adjacent front deck assemblies."

67. While the patent specifications show embodiments in which there are fewer rear decks than front decks, one of ordinary skill in the art would not limit the interpretation to fewer rear decks than front decks. In fact, if there are any additional rear cutting decks that are positioned outside of the front cutting decks, those additional cutting decks would merely be additional non-claimed elements. Furthermore, I am informed and understand that the claims of the Textron patents are written in "open-ended" form by virtue of using the transition word "comprising." I am informed and understand that this transition phrase allows for an interpretation in which additional elements may be present, but are not taken into account for purposes of infringement or invalidity. Thus, any rear deck assemblies that are not "aligned with

a respective gap between adjacent front deck assemblies" (by virtue of being outside the front deck assemblies) are merely additional features.

68. I understand that Toro believes that this limitation means "every rear deck assembly is located behind a gap defined by two adjacent front deck assemblies." As I understand it, Toro seeks to interpret the word "each" as meaning "every." Yet, the remainder of Toro's proposed construction essentially repeats the original claim language and does not add to or clarify the meaning of the claim in any way that would be necessary for the jury. Accordingly, the only true interpretation Toro seeks is to change the word "each" to be "every." I respectfully disagree with this interpretation. The claims do not use the word "every."

"Roller"

69. In my opinion, the term "roller" should be interpreted according to its ordinary and accustomed meaning, namely, "a device that rolls," for example, a cylinder that rolls or turns on its axis. In fact, "roller" is used in the specification and claims consistently with its ordinary meaning. *See, e.g.,* '530 patent at 1:44-56 ("…a rear roller extending between the side plates and supporting the side plates for movement over the ground…"); *id.* at 3:16-19 ("A rear roller 58 extends between the side plates 46 and 48 and also supports the side plates 46 and 48 and the deck 38 for movement over the ground."); *id.* at Figs 2, 3 and 5; and '312 patent at 5:60-65, 6:20-41, 6:42-53, 6:62-65, 6:67-7:12, 7:19-22, 7:23-33, 7:34-42, 7:53-58, 7:59-67, 8:7-9, and Figs. 1-9, 11-20 and 22-23 (describing and illustrating various rollers).

70. I understand that Toro seeks to interpret the term "roller" to mean "a device that resists scalping and stripes the grass." On one hand, Toro's proposed interpretation narrows the interpretation of "roller" by reading into it the specific functional limitations from the specification of "striping" and resisting scalping. On the other hand, Toro's proposed

construction broadens and confuses the interpretation of "roller" by including any device that stripes grass and resists scalping, regardless of whether it would be considered a roller under any plausible definition, and regardless of whether it even rolls. For at least this reason, I respectfully disagree with Toro's interpretation.

VI. CONCLUSION

71. Accordingly, for the reasons discussed above, a person of ordinary skill in the art would construe the various functions and corresponding structures, materials and acts for performing the recited functions of the means-plus-function claim terms of the three patents-in-suit as set forth above.

I declare under the penalty of perjury under the laws of the United States of America that, to the best of my knowledge, the foregoing is true and correct.

August 4, 2006

Richard L. Parish, PhD, PE

EXHIBIT 1

TO

DECLARATION

OF

RICHARD L. PARISH, PhD, PE

CURRICULUM VITAE

Richard L. Parish, PE

Education:

University of Missouri	BSAE	1/67
University of Missouri	MSAE	1/68
University of Missouri	PhD	1/70

Professional Experience:

Employer	Position	Period of appt.
Louisiana State University	Professor	1988 - present
LSU Sweet Potato Research Station	Resident Director	1991 - 1992
Louisiana State University	Associate Professor	1983 - 1988
O.M. Scott and Sons Company	Manager, Mech. R&D	1974 - 1983
University of Arkansas	Associate Professor	1973 - 1974
University of Arkansas	Assistant Professor	1969 - 1973
University of Missouri	NSF Fellow	1967 - 1969
Hesston Corporation	Engineer	summer 1967

Independent consulting projects concurrent with employment by Louisiana State University and the University of Arkansas.

Registration:

Registered Professional Engineer (Ohio -- #E-040521)

Office:

Hammond Research Station
21549 Old Covington Highway
Hammond, LA 70403
985-543-4125 (voice)
985-543-4124 (FAX)
dparish@agcenter.lsu.edu

Home:

21135 Highway 16
Amite, LA 70422
985-748-7019 (voice)
985-748-3813 (fax)
rlp70422@aol.com

CONSULTING ACTIVITIES

Forensic engineering and expert witness testimony in cases involving personal injury, product liability, product performance, and patents in the following areas:

Agricultural equipment
Lawn and garden equipment
Grounds maintenance equipment
Forestry equipment

Design, development, and testing activities including fertilizer spreaders, cultivators, and toolbars.

WEBSITE

with Extension articles
http://www.agctr.lsu.edu/mcms/webtools/search.aspx?q=Parish%2C%20Richard&t=Site

RESPONSIBILITIES WHILE EMPLOYED BY O. M. SCOTT AND SONS COMPANY

Managed Mechanical Research and Development Department.
Responsible for all research, design, development, testing, and technical service for a product line with annual sales of up to $10,000,000.
Provided mechanical engineering technical services for entire company.
Responsible for development of mechanical products for subsidiary company, W. Atlee Burpee.
Served as Project Manager for startup of new spreader manufacturing plant.

RESEARCH AREAS AT LOUISIANA STATE UNIVERSITY

Current:
Engineering for commercial landscape and consumer horticulture

Completed:
Production engineering for horticultural crops
Cultural practices and mechanization for commercial horticultural crops.
Mechanization, cultural practices, and operating safety for commercial horticultural crops
Fertilizer and chemical application
Marshgrass transplanting
Sugarcane mechanization
Christmas tree mechanization
Crawfish harvesting
Minimum tillage

RESEARCH AREAS AT THE UNIVERSITY OF ARKANSAS

Development of a cultural system for narrow-row cotton
Seedcotton handling

AWARDS AND HONORS RECEIVED

Doyle Chambers Award for Excellence in Research (LSU AgCenter, 2001)

ITT Quality Award (presented to an average of one employee in 1500, worldwide) -- presented in recognition of work as project manager for startup of a new mechanical manufacturing facility.

O.M. Scott Research Directors' Award -- presented in recognition of work as project manager for startup of a new mechanical manufacturing facility.

O.M. Scott Patent Awards (2)

NSF Fellowship -- support for graduate study at the University of Missouri.

Eagle Scout

Listed in:
Who's Who in the World
Dictionary of International Biography
Who's Who in America
Who's Who in Science and Engineering
American Men and Women of Science
Who's Who in Finance and Industry
Men of Achievement
Who's Who in the South and Southwest
Who's Who in Technology
International Who's Who of Professionals

MACHINERY AND SYSTEMS DEVELOPED
At Louisiana, Arkansas, and O.M. Scott

These machines and systems were either designed by R. L. Parish, or by engineers under the direct management of R. L. Parish.

Bellcrank linkage to reduce load on windrower rolls **(produced commercially)**
Automatic guidance system for hydrostatic vehicles
Narrow-row, vertical-plate planter
Self-propelled narrow-row cotton stripper
Pull-type narrow-row cotton stripper
Automatic control system for cotton module builder
Folding lawn cart
Precision metal drop-type fertilizer spreader **(produced commercially)**
Professional rotary spreader, reduced cost **(produced commercially)**
Electrically-powered professional rotary spreader **(produced commercially)**
Improved homeowner rotary spreader **(produced commercially)**
Low-cost homeowner rotary spreader **(produced commercially)**
Elliptical shroud rotary spreader
Professional rotary spreader with spiral cone **(produced commercially)**
Plastic drop spreader
Nursery drop tube applicator **(produced commercially)**
House plant fertilizer applicator **(produced commercially)**
Cartridge-type hose end applicator
Double-bottle hose end applicator
Turf plot applicator
Vegetable plot applicator
Automatic control system for sugarcane planter
Christmas tree harvesting saw
Marshgrass planter
Alternative pattern control system for professional rotary spreader
Dibble fertilizer applicator for use on nursery potting machine
Dibble opener/fertilizer applicator for use in nursery beds
Electrical feedback control system for hydraulic cylinders
Vegetable bed shaper
Carrot undercutter
Side-dumping vegetable harvest wagon
Harvest aid for vegetables
Duster for sweet potatoes
8-row folding toolbar
Improved disk meter for measuring turfgrass height
Test device to measure sod tensile strength
Metering system for applying methyl bromide to individual pots
Spool bed shapers
Multiple cone spool shaper to simulate rounded beds
Modified flail mower to spray and incorporate herbicide prior to dropping mulch back on surface
Research sprayer for peppers
Belt planter for soybeans
Automated plastic mulch collector

PROFESSIONAL AND SERVICE ACTIVITIES

Consulting Editor (Machinery) - *Journal of Vegetable Crop Production* (1992-)

Associate Editor (Vegetable and fruit production engineering) - *Transactions of ASAE* and *Applied Engineering in Agriculture* (1998-2003)

Agricultural Development Foundation, Ltd. (an organization that supports agricultural missionaries), Board of Directors (1992-), Vice President (1998-2000), Secretary (2005-)

Engineering Ministries International (a national organization that provides design services to missionaries) - participated in 10-day design project in Nicaragua, 2002.

American Society of Agricultural Engineers -- Committees

E-1, Program Committee (1986-87)
T-2, Agricultural Safety Committee (1992-1994)
ESH-01 (Formerly T-15), Ergonomics, Safety, and Health Committee (1994-), ESH-03 (formerly T-15/3), Standards Approval Subcommittee (review new and revised ASAE standards for safety content)
PM-02, Power and Machinery Division Steering Committee (1983-84, 1985-87, 1994-95, 1999-2001)
PM-04, Power and Machinery Division Publications Committee (1998-2003)
PM-06, Power and Machinery Division Technical Coordinating Committee (1982-83, 1994-95)
PM-07, Power and Machinery Division Program Committee (1981-82, 1984-87, 1989-91, 1997-99), Chairman (1986-87)
PM-23/6 (formerly PM-41), Application Systems Committee (1975-84, 1985-88, 1995-07), Chairman (1982-83), Chairman Fertilizer Appl. Subcommittee (1978-80), Chairman, PM-41/3, Dry Materials Application Subcommittee (1996-2000)
PM-42, Cultural Practices Equipment Committee (1986-2000, 2002-08), Program Chairman (1989-1991), Vice Chairman (1993-1994), Chairman (1994-1995)
PM-48, Fruit and Vegetable Production Engineering Committee (1985-88, 1989-1993, 1996-2008), Vice Chairman (1997-1999), Chairman (1999-2001)); liaison to ASHS Production and Harvest Mechanization Working Group (2002-)
PM-54, Mechanization of Agricultural Research Committee (1979-82)
PM-58, Agricultural Equipment Automation Committee (1970-73)
PM-59, Nursery and Greenhouse Mechanization Committee (1977-84, 1988-1991)
Mid-Central Region, President, Student Branch (1967)

Development of ASAE Standard

Author of latest revision of ASAE Standard S341.3, Procedure for Measuring Distribution Uniformity and Calibrating Granular Broadcast Spreaders and coauthor of two prior versions.

American Society for Horticultural Science
Production and Harvest Mechanization Working Group
Vegetable Cultural Practices Working Group

Southern Region, American Society for Horticultural Science
Chairman, Vegetable Section (1997)

Southern Regional Information Exchange Group on Fruit and Vegetable Mechanization, Vice Chairman (1989-1990), Chairman (1990-1991)

Louisiana Vegetable Growers Association

Louisiana Turfgrass Association

Louisiana Nursery and Landscape Association

Registered Professional Engineer

Registered Commercial Pesticide Applicator

Honor societies

Tau Beta Pi
Sigma Xi
Gamma Sigma Delta
Alpha Epsilon
Omicron Delta Kappa
Pi Mu Epsilon
Phi Eta Sigma

REVIEW ACTIVITIES

Served on review panel for USDA SBIR grant program, Washington, DC, Feb. 10-11, 1994.

Reviewed articles for:

Applied Engineering in Agriculture
Journal of Vegetable Crop Production
Transactions of ASAE
HortTechnology
Journal of Environmental Quality
Louisiana Agriculture
Canadian Agricultural Engineering
Canadian Biosystems Engineering
Soil and Tillage Research
Journal of the Florida State Horticulture Society
Journal of ASTM International
Computers and Electronics in Agriculture

CONSULTING ACTIVITIES

Design, development, and testing activities including fertilizer spreaders, cultivators, and toolbars.
Forensic engineering in cases involving personal injury, product liability, product performance, and patents in the following areas:

Agricultural equipment
Lawn and garden equipment
Grounds maintenance equipment
Forestry equipment

EXTENSION ACTIVITIES

Serve as State Extension Specialist for lawn, garden, and grounds maintenance equipment
Serve as State Extension Specialist for commercial vegetable equipment

COURSES DEVELOPED AND/OR TAUGHT AT LSU

Agricultural Engineering Courses -- College of Engineering

AGE 1248 Production Machinery in Agriculture. General introductory course covering all areas of agricultural engineering.

AGE 1249 Introduction to Agricultural Engineering Design. Developed completely new course based on personal experience in industry. This course offered an introduction to engineering design tools, then provided an opportunity for students to study practical design considerations and carry out a major individual design problem. Developed all materials for this course.

AGE 3104 Proseminar. Senior course for agricultural engineering and agricultural mechanization majors. Emphasis on preparing term papers. Developed new section on engineering law--patents, product liability.

BAE 4190 Senior Engineering Design. Senior capstone design course. Developed entirely new course materials based on my experience in industry.

AGE 7305 Advanced Power and Machinery. Developed completely new course emphasizing practical machine design considerations in industry. Introduced new concepts such as plastics part design, value engineering, cost analysis, and product liability. Provided practical individual and group problems in all areas studied. Based course on personal experience managing product development department in industry.

Agricultural Mechanization Courses -- College of Agriculture

AGM 2094, IAT 2094, BAE 2294 Agricultural Chemical Application. Completely revised this course and developed all new lecture notes, homework problems, tests, visual aids, etc. with increased emphasis on granular application and horticultural application. Introduced significant new material based on experience in ag chemical industry and ASAE chemical application committee contacts.

AGM 2066, IAT 2066 Agricultural Field Machinery. Course in basic field machinery with emphasis on selection and management. Developed new course materials including visual aids, handouts, and printed class notes.

AGM 3083 Farm and Power Equipment Sales and Service. Course in management of agricultural, industrial, and lawn and garden equipment dealerships. Includes overall dealership management as well as parts, sales and service management. Developed all course materials including lecture notes, visual aids, homework, tests, handouts. Revised course content to reflect personal experience in farm equipment retailing and manufacturing.

CONTINUING EDUCATION COURSES COMPLETED
(primarily in administration and management)

American Management Association

Seminars:

Fundamentals of Management for New R & D Supervisors
Basic Project Management: Planning, Scheduling and Control
Leadership Skills for Project Managers

Extension Courses:

Human Behavior in the Organization
Getting Results through MBO
Transactional Analysis for Managers
The Management of Technological Change
Modern Marketing and Company Objectives
Advertising: Strategy and Design
Strategies in Marketing Research
How to be a Successful Product Manager
Accounting for Managers
Return on Investment
Basics of Cost Accounting
Manufacturing Management

American Society of Agricultural Engineers

Product Liability
Human Factors Concepts and Methods for Agricultural Engineers
Technical Sales Management and Forecasting in Agribusiness

American Society of Mechanical Engineers

Digital Electronics in Mechanical Systems
Computer Graphics

Society of Manufacturing Engineers

Understanding Paint and Painting Processes

Internal O. M. Scott courses

Basic Management
Time Management
Career Planning
Negotiation Skills
Statistics

Technical Training

Small Engine Repair

Louisiana Comprehensive Public Training Program

Management in State Government -- Level I

Louisiana State University Agricultural Center -- International Programs

Spanish training (22 semesters)

LSU AutoCad Training Center

AutoCad Level I

PUBLICATIONS

Richard L. Parish, PE

Articles in refereed journals

Transactions of the ASAE

Goering, C. E., S. J. Marley, J. A. Koch, and R. L. Parish. 1968. Determining the mass moment of inertia of a tractor using floor suspension. *Transactions of the ASAE* 11(3):416-418.

Parish, R. L and C. E. Goering. 1970. Developing an automatic steering system for a hydrostatic vehicle. *Transactions of the ASAE* 13(4):523-527.

Parish, R. L. and C. E. Goering. 1971. Simulation of an automatic steering system for a hydrostatic vehicle. *Transactions of the ASAE* 14(3):450-454.

Parish, R. L. 1972. Development of a narrow-row, vertical-plate planter. *Transactions of the ASAE* 15(4):636-637.

Parish, R. L., S. M. Brister and D. E. Mermoud. 1974. Preliminary results of wide-bed narrow-row cotton research. *Transactions of the ASAE* 17(6):1073-1075.

Parish, R. L. and K. R. Shelby. 1974. Design of a cotton brush harvester for four narrow rows. *Transactions of the ASAE* 17(6):1076-1077.

Parish, R. L. and K. R. Shelby. 1974. The effect of seedcotton storage on seed and lint quality. *Transactions of the ASAE* 17(6):1078-1079.

Shelby, K. R. and R. L. Parish. 1975. An automatic control system for a cotton module builder. *Transactions of the ASAE* 18(2):231-232.

Parish, R. L. and P. P. Chaney. 1984. Evaluation of new lawn fertilizer application technology. *Transactions of the ASAE* 28(1):36-39.

Parish, R. L. and P. P. Chaney. 1985. Evaluation of a rotary spreader with a helical cone for drop point control. *Transactions of the ASAE* 28(5):1440-1444.

Parish, R. L. 1986. Evaluation of two methods of fertilizer spreader pattern correction. *Transactions of the ASAE* 29(2):370-373.

Parish, R. L., P. P. Chaney and F. E. Sistler. 1986. Evaluation of a modified air carrier sprayer in sugarcane. *Transactions of the ASAE* 29(1):34-36.

Parish, R. L. and P. P. Chaney. 1986. Pattern sensitivity to location of fertilizer drop point on a rotary spreader impeller. *Transactions of the ASAE* 29(2):374-377.

Parish, R. L. 1999. An automated machine for removal of plastic mulch. *Transactions of the ASAE* 42(1):49-51.

Applied Engineering in Agriculture

Parish, R. L., P. P. Chaney and R. E. Joost. 1986. Granular fertilizer knives for minimum sod disturbance in strip-till planting. *Applied Engineering in Agriculture* 2(1):18-20.

Parish, R. L. 1986. Comparison of spreader pattern evaluation methods. *Applied Engineering in*

Agriculture 2(2):89-93.

Parish, R. L. and P. P. Chaney. 1986. Speed effects on drop-type spreader application rate. *Applied Engineering in Agriculture* 2(2):94-96.

Chaney, P. P., R. L. Parish and F. E. Sistler. 1986. An automatic control system for a sugarcane planter. *Applied Engineering in Agriculture* 2(2):51-54.

Parish, R. L. 1987. A computer program for spreader pattern analysis. *Applied Engineering in Agriculture* 3(1):14-16.

Parish, R. L. 1987. The effect of speed on performance of a rotary spreader. *Applied Engineering in Agriculture* 3(1):17-19.

Parish, R. L., P. P. Chaney, and D. L. Fuller. 1987. Comparison of laboratory methods of spreader pattern evaluation with agronomic response. *Applied Engineering in Agriculture* 3(2):237-240.

Parish, R. L., P. P. Chaney, S. C. Porteus, and C. J. Gernon. 1988. Basic data on air requirements for cleaning Christmas trees. *Applied Engineering in Agriculture* 4(1):30-32.

Porteus, S. C., R. L. Parish, and M. E. Wright. 1989. Development of a marshgrass planting system. *Applied Engineering in Agriculture* 5(2):138-142.

Parish, R. L., P. P. Chaney, and F. E. Baker. 1989. Field evaluation of sugarcane planters. *Applied Engineering in Agriculture* 5(2):127-132.

Parish, R. L. and P. de Visser. 1989. Experimental verification of the effect of collection pan width on apparent spreader pattern. *Applied Engineering in Agriculture* 5(2):163-164.

Parish, R. L., S. G. Aman, and J. C. Nye. 1990. Industrial and agricultural technology -- a combined curriculum at Louisiana State University. *Applied Engineering in Agriculture* 6(1):61-64.

Parish, R. L., R. P. Bracy, D. W. Wells, and P. E. Bergeron. 1990. A comparison of cultivation methods for commercial vegetable crops. *Applied Engineering in Agriculture* 6(5):565-568.

Parish, R. L. 1990. Spreader pattern as influenced by operating mode. *Applied Engineering in Agriculture* 6(6):687-690.

Parish, R. L., D. W. Wells, P. E. Bergeron, H. F. Morris, and S. A. Bartkiewicz. 1990. Evaluating herbicide incorporation methods for bedded crops. *Applied Engineering in Agriculture* 6(6):707-711.

Parish, R. L. 1991. Effect of an adjustable drop point on turf fertilizer spreader patterns. *Applied Engineering in Agriculture* 7(1):5-9.

Parish, R. L. 1991. Effect of rough operating surface on rotary spreader distribution pattern. *Applied Engineering in Agriculture* 7(1):61-63.

Parish, R. L. and P. E. Bergeron. 1991. Field and laboratory study of a pendulum-action spreader. *Applied Engineering in Agriculture* 7(2):163-167.

Parish, R. L. 1991. Effect of material bouncing into and out of collection pans on observed spreader distribution pattern. *Applied Engineering in Agriculture* 7(3):311-315.

Parish, R. L. 1991. The effect of relative humidity on rotary turf spreader patterns. *Applied Engineering in Agriculture* 7(5):541-544.

Parish, R. L., P. E. Bergeron, and R. P. Bracy. 1991. Comparison of vacuum and belt seeders for vegetable planting. *Applied Engineering in Agriculture* 7(5):537-540.

Parish, R. L. 1992. Distribution of peanut hull granules with commercial turf applicators. *Applied Engineering in Agriculture* 8(1):13-14.

Bergeron, P. E., R. L. Parish, R. P. Bracy, R. A. Hinson, and J. E. Boudreaux. 1992. Economics of direct seeding cabbage to a stand using precision cultural systems. *Applied Engineering in Agriculture* 8(5):581-584.

Bracy, R. P., R. L. Parish, and P. E. Bergeron. 1992. Detachment forces for fresh-market cucumbers. *Applied Engineering in Agriculture* 8(6):747-749.

Parish, R. L. 1993. The effect of formulation on the application characteristics of pesticide granules. *Applied Engineering in Agriculture* 9(5):419-421.

Bracy, R. P., R. L. Parish, P. E. Bergeron, and R. J. Constantin. 1993. Comparison of flat and rounded planting beds for vegetable crops. *Applied Engineering in Agriculture* 9(3):271-275.

Parish, R. L., R. P. Bracy, P. E. Bergeron, and R. J. Constantin. 1993. Precision cultivation of bedded vegetable crops. *Applied Engineering in Agriculture* 9(5):415-418.

Parish, R. L. and W. C. Porter. 1994. Spreader patterns using ASAE S341.2 compared to patterns in golf-cup sized holes in turfgrass. *Applied Engineering in Agriculture* 10(6):783-786.

Bracy, R. P., R. L. Parish, P. E. Bergeron, H. F. Morris, Jr., and S. A. Bartkiewicz. 1994. Fertilizer placement in planting beds for vegetable production. *Applied Engineering in Agriculture* 10(2):201-204.

Parish, R. L. and R. P. Bracy. 1995. Spool vs. pan bed shapers for vegetable crops. *Applied Engineering in Agriculture* 11(1):13-16.

Parish, R. L., D. B. Reynolds, and S. H. Crawford. 1995. Precision guided cultivation techniques to reduce herbicide inputs in cotton. *Applied Engineering in Agriculture* 11(3):349-353.

Parish, R. L. 1995. Pattern skewing with a pendulum spreader. *Applied Engineering in Agriculture* 11(4):511-512.

Parish, R. L. 1995. Estimating effective swath width with a pendulum spreader. *Applied Engineering in Agriculture* 11(4):507-509.

Parish, R. L. 1996. Particle size effects on collection efficiency across spreader pattern tests. *Applied Engineering in Agriculture* 12(5):527-529.

Parish, R. L., R. L. Hutchinson, D. B. Reynolds, and D. L. Jordan. 1997. Weed control in conservation tillage systems for cotton. *Applied Engineering in Agriculture* 13(5):583-587.

Parish, R. L. 1997. Spreader pattern uniformity at field ends. *Applied Engineering in Agriculture* 13(5):577-581.

Parish, R. L. and J. D. Fry. 1997. Mower effects on turfgrass quality. *Applied Engineering in Agriculture* 13(6):715-717.

Parish, R. L. 1998. Operating force requirements for manual pruning shears. *Applied Engineering in Agriculture* 14(4):349-352.

Parish, R. L., J. E. McCoy, and R. P. Bracy. 1999. Belt-type seeder for soybeans. *Applied Engineering in Agriculture* 15(2):103-106.

Parish, R. L. 1999. Rate consistency of small drop spreaders. *Applied Engineering in Agriculture* 15(3):217-219.

Parish, R. L. 1999. Effect of hopper angle on drop spreader delivery rate. *Applied Engineering in Agriculture* 15(4):279-281.

Parish, R. L. 1999. Effect on delivery rate of pulling a drop spreader backward. *Applied Engineering in Agriculture* 15(5):429-430.

Parish, R. L. 1999. The effect of spreader fill level on delivery rate. *Applied Engineering in Agriculture* 15(6):647-648.

Parish, R. L. 1999. The effect of multiple passes on spreader pattern test results. *Applied Engineering in Agriculture* 15(6):643-645.

Parish, R. L. 2000. Evaluation of a lawn spreader with an elliptical shroud. *Applied Engineering in Agriculture* 16(2):115-117.

Parish, R. L. 2000. Spreader rate determinations from pattern tests compared with rate calibration. *Applied Engineering in Agriculture* 16(2):119-120.

Parish, R. L. 2000. Evaluation of one-sided throw controls on walk-behind turf spreaders. *Applied Engineering in Agriculture* 16(4):387-390.

Parish, R. L. 2000. Ramifications of method of selecting effective swath width. *Applied Engineering in Agriculture* 16(5):493-495.

Parish, R. L. 2001. Pattern uniformity with homeowner rotary spreaders. *Applied Engineering in Agriculture* 17(2):127-130.

Parish, R. L. 2001. Effect of agglomerated corn cob additive on spreader performance of corn cob carrier product. *Applied Engineering in Agriculture* 17(3):281-282.

Parish, R. L. 2001. Spreader damage to encapsulated controlled-release fertilizer granules. *Applied Engineering in Agriculture* 17(4):457-458.

Parish, R. L. 2001. Effect of coating thickness on spreader damage to encapsulated controlled-release fertilizer granules. *Applied Engineering in Agriculture* 17(4):459-460.

Parish, R. L. 2001. Side-to-side pattern variation with consumer drop-type spreaders. *Applied Engineering in Agriculture* 17(5):595-598.

Parish, R. L. 2001. The effects of spout height and PTO speed on banding with a pendulum-action spreader. *Applied Engineering in Agriculture* 17(6):765-766.

Parish, R. L. 2002. Broadcast spreader pattern sensitivity to impeller/spout height and PTO speed. *Applied Engineering in Agriculture* 18(3):297-299.

Parish, R. L. 2002. Rate setting effects on fertilizer spreader distribution patterns. *Applied Engineering in Agriculture* 18(3):301-304.

Parish, R. L. 2002. Performance of a family of spreaders. *Applied Engineering in Agriculture* 18(4):453-456.

Parish, R. L. 2003. Delivery patterns with hand-carried, hand-cranked nursery spreaders. *Applied Engineering in Agriculture* 19(1):39-44.

Parish, R. L. 2003. Turf spreader rate setting increments. *Applied Engineering in Agriculture* 19(2):155-157.

Parish, R. L. 2003. Effect of impeller angle on pattern uniformity. *Applied Engineering in Agriculture* 19(5):531-533.

Parish, R. L. 2003. Comparison of pattern adjustment methods on professional rotary turf spreaders. *Applied Engineering in Agriculture* 19(5):535-537.

Parish, R. L. 2003. Evaluation of a homeowner rotary spreader with deflector to close one side of the pattern. *Applied Engineering in Agriculture* 19(6):641-643.

Parish, R. L. 2003. Comparison of ASAE S341.3 spreader pattern testing with stationary spreader pattern tests. *Applied Engineering in Agriculture* 19(6):645-648.

Parish, R. L. 2005. Evaluation of a slow-release fertilizer powder for landscape spraying. *Applied Engineering in Agriculture* 21(5):755-760.

Parish, R. L. 2005. The effect of impeller drive gear ratio on rotary spreader patterns. *Applied Engineering in Agriculture* 21(6):987-989.

Journal of Environmental Horticulture

Parish, R. L., R. J. Constantin, W. L. Brown, and D. W. Wells. 1986. Development of an automated fertilizer applicator for potting machines. *Journal of Environmental Horticulture* 4(3):91-94.

Parish, R. L., P. P. Chaney, W. A. Meadows, and D. L. Fuller. 1988. A dibble fertilizer applicator for containers in nursery beds. *Journal of Environmental Horticulture* 6(2):63-66.

Porter, W. C. and R. L. Parish. 1993. Nontarget losses of granular herbicide applied to container-grown landscape plants. *Journal of Environmental Horticulture* 11(3):143-146

Parish, R. L. 1994. Sensitivity of a hand-cranked nursery spreader to operator variables. *Journal of Environmental Horticulture* 12(4):187-190.

HortTechnology

Bracy, R. P., R. L. Parish, and W. A. Mulkey. 1991. High density planting in a precision cultural system for vegetable production. *HortTechnology* 1(1):54-58.

Parish, R. L., E. W. Bush, and D. P. 1994. Shepard. A simplified turfgrass height-measuring device. *HortTechnology* 4(1):49-50.

Parish, R. L. 1995. A simple device to measure sod strength. *HortTechnology* 5(4):308-309.

Porter, W. C. and R. L. Parish. 1997. Evaluation of a bulk planting system for low-cost seeding of cabbage. *HortTechnology* 7(3):247-250.

Parish, R. L., R. P. Bracy, and H. F. Morris. 1997. Broadcast vs. band applications of fertilizer on vegetable crops. *HortTechnology* 7(4):389-395.

Bracy, R. P. and R. L. Parish. 1998. Evaluating seed covering devices and presswheels for directly

seeding mustard and cabbage. *HortTechnology* 8(1):74-77.

Parish, R. L. and R. P. Bracy. 1998. Metering nonuniform vegetable seed. *HortTechnology* 8(1):69-71.

Bracy, R. P. and R. L. Parish. 1998. Seeding uniformity of precision seeders. *HortTechnology* 8(2):182-185.

Bracy, R. P., R. L. Parish, and J. E. McCoy. 1999. Precision seeder uniformity varies with theoretical spacing. *HortTechnology* 9(1):47-50.

Bracy, R. P. and R. L. Parish. 2001. A comparison of seeding uniformity of agronomic and precision vegetable seeders. *HortTechnology* 11(2):184-186.

Parish, R. L and R. P. Bracy. 2002. An attempt to improve uniformity of a Gaspardo precision seeder. *HortTechnology* 13(1):100-103.

Bracy, R. P., R. L. Parish, and R. M. Rosendale. 2003. Fertigation uniformity affected by injector type. *HortTechnology* 13(1):103-105.

Parish, R. L. and R. P. Bracy. 2004. Recommendations for effective use of a garden seeder for research plots and gardens. *HortTechnology* 14(2):257-261.

Parish, R. L. 2005. Current developments in seeders and transplanters for vegetable crops. *HortTechnology* 15(2):346-351.

Parish, R.L. 2006. Review of granular applicators for turfgrass**.** HortTechnology (in press).

HortScience

Bracy, R. P., R. L. Parish, P. E. Bergeron, E. B. Moser, and R. J. Constantin. 1993. Planting cabbage to a stand with precision seeding. *HortScience* 28(3):179-181.

Bracy, R. P., R. L. Parish, and E. B. Moser. 1995. Planting cauliflower to a stand with precision seeding. *HortScience* 30(3):484-486.

Journal of Vegetable Crop Production

Bracy, R. P., R. L. Parish, and P. E. Bergeron. 1995. Sidedress N application methods for broccoli production. *Journal of Vegetable Crop Production* 1(1):63-71.

Parish, R. L. and R. P. Bracy. 1995. Rolling beds after precision planting enhances bed integrity at harvest. *Journal of Vegetable Crop Production* 1(2):41-50.

Parish, R. L., R. P. Bracy, and W. C. Porter. 1996. Finger-wheel cultivators for high-speed cultivation of vegetable crops. *Journal of Vegetable Crop Production* 2(1):3-11.

Parish, R. L., C. M. LaBorde, and T. J. Raiford. 1997. Plant and row spacing for southern pea and snap bean. *Journal of Vegetable Crop Production* 2(2):65-75.

Parish, R. L. 1997. A laboratory device to apply pesticide dust to crates of produce. *Journal of Vegetable Crop Production* 3(1):69-72.

Parish, R. L. and C. M. LaBorde. 1997. An alternative to precision planting for leafy greens crops in a precision cultural system. *Journal of Vegetable Crop Production* 3(1):21-25.

Bracy, R. P. and R. L. Parish. 1997. Row number, seed spacing, and fertilizer rate effects on melon

production. *Journal of Vegetable Crop Production* 3(1):47-57.

Shelton, A. R., Jr., R. L. Parish, and C. M. LaBorde. 1997. Apparatus to facilitate changing seed in planting research plots. *Journal of Vegetable Crop Production* 3(2):3-8.

Parish, R. L., W. C. Porter, and P. R. Vidrine. 1997. Flame cultivation as a complement to mechanical and herbicidal control of weeds. *Journal of Vegetable Crop Production* 3(2):65-83.

Parish, R. L., R. P. Bracy, and J. E. McCoy. 1999. Row configuration and seed spacing for greens. *Journal of Vegetable Crop Production* 4(2):75-81.

Parish, R. L. and J. E. McCoy. 1999. Inconsistency of metering with a precision vegetable seeder. *Journal of Vegetable Crop Production* 4(2):3-7.

Parish, R. L. and R. P. Bracy. 1999. Effects of seed depth and opener type on seed emergence. *Journal of Vegetable Crop Production* 4(2):57-63.

Bracy, R. P. and R. L. Parish. 1998. Response of mustard and turnip cultivars to harvesting height. *Journal of Vegetable Crop Production* 4(2):37-43.

Parish, R. L., R. P. Bracy, and J. E. McCoy. 1999. Bed height for greens crops. *Journal of Vegetable Crop Production* 5(2):73-78.

Parish, R. L., R. P. Bracy, and J. E. McCoy. 2000. Field incineration of plastic mulch. *Journal of Vegetable Crop Production* 6(1):17-23.

Parish, R. L., R. P. Bracy, and J. E. McCoy. 2000. Broadcast vs. band fertilizer applications on summer squash. *Journal of Vegetable Crop Production* 6(2):27-36.

Parish, R. L. 2000. Stand of cabbage and broccoli in single- and double-drill plantings on beds subject to erosion. *Journal of Vegetable Crop Production* 6(2):87-96.

Bracy, R. P., R. L. Parish, and J. E. McCoy. 2000. Seeding rate affects root production of turnip [*Brassica rapa* L. (Rapifera Group)]. *Journal of Vegetable Crop Production* 6(2):43-50.

Parish, R. L., R. P. Bracy, and R. M. Rosendale. 2002. Use of plastic mulch for successive crops. *Journal of Vegetable Crop Production* 8(1):63-70.

Other publications

Abstracts

Sverzut, C. B. and R. L. Parish. 1986. Electrical control for hydraulic cylinders on harvesters. *Journal of ASSCT* (abstract) 6:139.

Morris, D. R., R. E. Joost, D. L. Friesner, L. Mason, and R. Parish. 1989. Planter-type and herbicide combinations for maximum corn yields. *Agronomy Abstracts* S6-007.

Parish, R. L., P. E. Bergeron, R. P. Bracy, D. W. Wells, W. A. Mulkey, and W. A. Young. 1989. Mechanization of Commercial Horticultural Crops. 1989 Biennial Report of Vegetable Research in the Southern United States, Hawaii, and Puerto Rico; U.S. Vegetable Laboratory, United States Department of Agriculture, Agricultural Research Service, Charleston, SC, pp. 97, 99.

Bracy, R. P., R. L. Parish, P. E. Bergeron, E. B. Moser, and R. J. Constantin. 1990. Precision seeding for planting cabbage to a stand. *HortScience* 25(8):859 (abstract).

Porteus, S. C., R. L. Parish, and M. E. Wright. 1990. Economic analysis of marshgrass transplanters. *Coastal Research* 9(2):10-12.

Bracy, R. P., R. L. Parish, P. E. Bergeron, and B. Moser. 1991. Fertilizing broccoli grown in multiple rows per bed. 1991 Biennial Report of Vegetable Research in the Southern United States, Hawaii, and Puerto Rico; U.S. Vegetable Laboratory, United States Department of Agriculture, Agricultural Research Service, Charleston, SC, pp. 9-10.

Bracy, R. P., R. L. Parish, P. E. Bergeron, E. B. Moser, and R. J. Constantin. 1991. Precision seeding for planting cabbage to a stand. 1991 Biennial Report of Vegetable Research in the Southern United States, Hawaii, and Puerto Rico; U.S. Vegetable Laboratory, United States Department of Agriculture, Agricultural Research Service, Charleston, SC, p. 10.

Parish, R. L., P. E. Bergeron, R. P. Bracy, and W. C. Porter. 1991. Mechanization, cultural practices, and operating safety for commercial horticultural crops. 1991 Biennial Report of Vegetable Research in the Southern United States, Hawaii, and Puerto Rico; U.S. Vegetable Laboratory, United States Department of Agriculture, Agricultural Research Service, Charleston, SC, p. 115.

Bracy, R. P., R. L. Parish, P. E. Bergeron, and E. B. Moser. 1992. Fertilizer rates affect yields of high-density plantings of broccoli (Brassica oleracea). *HortScience* 27(11):1173.

Bracy, R. P., R. L. Parish, P. E. Bergeron, E. B. Moser, and R. J. Constantin. 1993. Seeding cabbage to a stand. 1993 Biennial Report of Vegetable Research in the Southern United States, Hawaii, and Puerto Rico; U.S. Vegetable Laboratory, United States Department of Agriculture, Agricultural Research Service, Charleston, SC, p. 9.

Porter, W. C. and R. L. Parish. 1993. Cabbage bulk seeding study. 1993 Biennial Report of Vegetable Research in the Southern United States, Hawaii, and Puerto Rico; U.S. Vegetable Laboratory, United States Department of Agriculture, Agricultural Research Service, Charleston, SC, p. 9.

Parish, R. L., R. P. Bracy, W. C. Porter, R. J. Constantin, W. J. Blackmon, and C. E. Motsenbocker. 1993. Mechanization, cultural practices, and operating safety for commercial horticultural crops. 1993 Biennial Report of Vegetable Research in the Southern United States, Hawaii, and Puerto Rico; U.S. Vegetable Laboratory, United States Department of Agriculture, Agricultural Research Service, Charleston, SC, p. 127.

Porter, W. C. and R. L. Parish. 1994. Bulk planting system for low-cost seeding of cabbage. *HortScience* 29(7):733 (abstract).

Bracy, R. P., R. L. Parish, and E. B. Moser. 1995. Precision seeding for planting cauliflower to a stand. *HortScience* 30(3):427 (abstract).

Parish, R. L., W. C. Porter, and C. M. LaBorde. 1996. Flame cultivation of lima beans and southern peas. Proceedings of the Louisiana Plant Protection Association 6:25 (abstract).

Parish, R. L. 1996. Flame cultivation for controlling weeds. *HortScience* 31(4):696 (abstract).

Porter, W. C. and R. L. Parish. 1996. Hooded spray application of postemergence herbicides for southernpea production. *HortScience* 31(5):748 (abstract).

Parish, R. L. 1996. High-speed cultivation of vegetable crops with finger-wheel cultivators. *HortScience* 31(5):748.

Parish, R. L. 1997. Flame cultivation for controlling weeds. *HortTechnology* 7(1):97 (abstract).

Parish, R. L., R. P. Bracy, and H. F. Morris, Jr. 1997. Broadcast vs. band applications of fertilizer for

vegetable crops. *HortScience* 32(4):599 (abstract).

Bracy, R. P. and R. L. Parish. 1997. Evaluation of presswheels and seed coverers for direct seeding of *Brassica*. *HortScience* 32(4):599 (abstract).

Bracy, R. P. and R. L. Parish. 1998. Seeding rate affects turnip root production. *HortScience* 33(4):596 (abstract).

Parish, R. L. and R. P. Bracy. 1998. Metering nonuniform vegetable seed. *HortScience* 33(4):598 (abstract).

Parish, R. L. 1999. An automated machine for removal of plastic mulch. *HortScience* 34(5):831 (abstract).

Bracy, R. P. and R. L. Parish. 1999. Precision vegetable seeders: how precise are they? *HortScience* 34(5):831 (abstract).

Parish, R. L. and R. P. Bracy. 2000. Bed and row configuration studies. *HortScience* 35(4):558 (abstract).

Bracy, R. P., R. L. Parish, and J. E. McCoy. 2000. Trifluralin rate affects cabbage stands. *HortScience* 35(4):558 (abstract).

Parish, R. L., R. P. Bracy, and R. M. Rosendale. 2001. Studies in Plastic Mulch for Multiple Cropping. *HortScience* 36(5):845 (abstract).

Bracy, R. P., R. L. Parish, and R. M. Rosendale. 2002. Timing of insecticide application on directly seeded cabbage stands. *HortScience* 37(5):745 (abstract).

Parish, R. L. and R. P. Bracy. 2002. Summer cover crops for a vegetable production system. *HortScience* 37(5):745 (abstract).

Parish, R. L. and R. P. Bracy. 2004. Suggestions for using the Earthway garden seeder. HortIdeas 21(6):69-70. Excerpted from HortTechnology 14(2):257-261.

Parish, R. L. and R.P. Bracy. 2004. Recommendations for effective use of a garden seeder for research plots and gardens. HortScience 39(3):661 (abstract).

Parish, R. L. 2004. Current developments and outlook for planters and transplanters for vegetable crops. *HortScience* 39(4):735 (abstract).

Papers presented at ASAE meetings

Parish, R. L. and C. E. Goering. 1969. Development of an automatic steering system for a hydrostatic vehicle. ASAE paper MC-69-502.

Parish, R. L. and C. E. Goering. 1969. Simulation of an automatic steering system for a hydrostatic vehicle. ASAE paper 69-641.

Parish, R. L. and G. W. Hanger. 1971. Development of a narrow-row, vertical-plate planter. ASAE paper 71-685.

Parish, R. L. and B. A. Waddle. 1972. Development of a wide-bed cultural system for growing narrow-row cotton. Paper presented at the 1972 meeting of the Southwest Region of the ASAE, Ruston, Louisiana.

Parish, R. L., S. M. Brister and D. E. Mermoud. 1973. Preliminary results of wide-bed narrow-row cotton research. ASAE paper MI-73-1578.

Walker, L. R. and R. L. Parish. 1974. An analysis of alternative machinery systems for wide-bed, narrow-row cotton. ASAE paper number 74-1542.

Amerine, J. D. and R. L. Parish. 1979. Development of a rotary spreader with an elliptical shroud. ASAE paper number 79-1511.

Parish, R. L. and P. P. Chaney. 1984. Evaluation of new lawn fertilizer application technology. ASAE paper 84-1503.

Parish, R. L., P. P. Chaney and F. E. Sistler. 1984. Evaluation of a modified air carrier sprayer in sugarcane. ASAE paper 84-1505.

Parish, R. L. and P. P. Chaney. 1985. Evaluation of a rotary spreader with a helical cone for drop point control. ASAE paper 85-1006.

Parish, R. L. and P. P. Chaney. 1985. Granular fertilizer knives for minimum sod disturbance in strip-till planting. ASAE paper 85-1004.

Parish, R. L. and P. P. Chaney. 1985. Pattern sensitivity to location of fertilizer drop point on a rotary spreader impeller. ASAE paper 85-1001.

Parish, R. L. 1985. Evaluation of two methods of spreader pattern correction. ASAE paper 85-1503.

Chaney, P. P., R. L. Parish and F. E. Sistler. 1986. An automatic control system for a sugarcane planter. ASAE paper SWR-86-001.

Parish, R. L. 1986. Do-it-yourself pattern evaluation for granular application. Paper number AA86-007 presented at the NAAA/ASAE Technical Session, Acapulco, Mexico, December 1-4.

Porteus, S. C., R. L. Parish, and M. E. Wright. 1986. Prototype vegetative marshgrass transplanting machine. ASAE paper number 86-1515.

Parish, R. L., P. P. Chaney, and F. E. Baker. 1987. Field evaluation of sugarcane planters. ASAE paper number 87-1020.

Parish, R. L. 1987. The effect of ground speed on rotary spreader patterns. ASAE paper number 87-1067.

Parish, R. L., P. P. Chaney, and D. L. Fuller. 1987. Comparison of spreader evaluation methods. ASAE paper number 87-1071.

Parish, R. L., P. P. Chaney, S. C. Porteus, and C. J. Gernon. 1987. Basic data on air requirements for cleaning Christmas trees. ASAE paper number 87-1571.

Porteus, S. C., R. L. Parish, and M. E. Wright. 1988. Development of a marshgrass transplanting system. ASAE paper number 88-1035.

Parish, R. L., R. P. Bracy, and W. A. Mulkey. 1989. A precision cultural system for vegetables in Louisiana. ASAE paper number 89-1566.

Parish, R. L., D. W. Wells, P. E. Bergeron, H. F. Morris, S. A. Bartkiewicz. 1990. Evaluating herbicide incorporation methods for bedded crops. ASAE paper number 90-1021.

Parish, R. L., R. P. Bracy, D. W. Wells, and P. E. Bergeron. 1990. A comparison of cultivation methods for commercial vegetable crops. ASAE paper number 90-1041.

Parish, R. L. 1990. Spreader pattern uniformity as influenced by operating mode. ASAE paper number 90-1058.

Parish, R. L. 1990. Effect of radial drop point location on a fertilizer spreader for turf. ASAE paper number 90-1594.

Parish, R. L. 1990. Effect of material bouncing into and out of collection pans on observed spreader distribution pattern. ASAE paper number 90-1599.

Parish, R. L., P. E. Bergeron, and R. P. Bracy. 1991. Comparison of vacuum and belt seeders for vegetable planting. ASAE paper number 91-1008.

Parish, R. L. 1991. Effect of rough operating surface on rotary spreader distribution pattern. ASAE paper number 91-1034.

Parish, R. L. and P. E. Bergeron. 1991. Field and laboratory study of a pendulum-action spreader. ASAE paper number 91-1035.

Parish, R. L., D. W. Wells, and P. E. Bergeron. 1991. Reinforcement of turfgrass sod. ASAE paper number 91-1562.

Parish, R. L. 1992. Peanut hull granules as a granular pesticide carrier. ASAE paper number 921067.

Bergeron, P. E., R. L. Parish, R. P. Bracy, R. A. Hinson, and J. E. Boudreaux. 1992. Economics of direct seeding cabbage to a stand using precision cultural systems. ASAE paper number 921074.

Bracy, R. P., R. L. Parish, and P. E. Bergeron. 1992. Detachment forces for fresh-market cucumbers. ASAE paper number 921076.

Bracy, R. P., R. L. Parish, P. E. Bergeron, and R. J. Constantin. 1993. Comparison of flat and rounded planting beds for vegetable crops. ASAE paper # 931037.

Parish, R. L., R. P. Bracy, P. E. Bergeron, and R. J. Constantin. 1993. Modified cone guide wheels for cultivating the sides of planting beds. ASAE paper # 93103893

Bracy, R. P., R. L. Parish, P. E. Bergeron, H. F. Morris, Jr., and S. A. Bartkiewicz. 1993. Fertilizer placement in planting beds for vegetable production. ASAE paper #931595.

Parish, R. L. 1993. The effect of formulation on the application of characteristics of pesticide granules. ASAE paper #931547.

Parish, R. L. and R. P. Bracy. 1994. Spool vs. pan-type bed shapers for vegetable crops. ASAE paper number 941005.

Parish, R. L., D. B. Reynolds, and S. H. Crawford. 1994. Precision guided cultivation to reduce herbicide inputs in cotton. ASAE paper number 941014.

Parish, R. L. and W. C. Porter. 1994. Spreader patterns using ASAE S341.2 compared to actual patterns on turfgrass. ASAE paper number 941062.

Porter, W. C. and R. L. Parish. 1994. Nontarget losses of granular herbicide applied to container-grown ornamentals. ASAE paper number 941061.

Bracy, R. P. and R. L. Parish. 1994. Effects of seeding rate and planter opener on carrots. ASAE paper number 941574.

Porter, W. C. and R. L. Parish. 1994. Evaluation of bulk planting systems for low-cost seeding of vegetable crops. ASAE paper number 941573.

Parish, R. L. 1994. Sensitivity of a hand-cranked nursery spreader to operator variables. ASAE paper number 941589.

Parish, R. L. 1995. Pattern skewing with a pendulum spreader. ASAE paper number 951303.

Parish, R. L. 1995. Estimating effective swath width with a pendulum spreader. ASAE paper number 951304.

Parish, R. L. and R. P. Bracy. 1995. The effect of rolling beds after precision planting. ASAE paper number 951771.

Parish, R. L., R. P. Bracy, and W. C. Porter. 1995. High-speed cultivation of vegetable crops using finger-wheel cultivators. ASAE paper number 951772.

Parish, R. L. 1996. Particle size effects on collection efficiency across spreader pattern tests. ASAE paper number 961090.

Parish, R. L. and C. M. LaBorde. 1996. An alternative to precision planting for leafy greens crops in a precision cultural system. ASAE Paper No. 961108.

Parish, R. L., W. C. Porter, and P. R. Vidrine. 1997. Flame weed control for vegetable crops. ASAE paper number 971001.

Parish, R. L., R. L. Hutchinson, D. B. Reynolds, and D. L. Jordan. 1997. Weed control in conservation tillage systems for cotton. ASAE paper number 971008.

Parish, R. L., R. P. Bracy, and H. F. Morris, Jr. 1997. Broadcast vs. band applications of fertilizer on vegetable crops. ASAE paper number 971020.

Parish, R. L. 1997. Spreader pattern distortion at field ends. ASAE paper number 971048.

Bracy, R. P., R. L. Parish, and J. E. McCoy. 1998. Precision seeder uniformity varies with theoretical spacing. ASAE paper number 981095.

Parish, R. L. 1999. Studies in homeowner spreader performance variables. ASAE paper number 991014.

Parish, R. L. 2000. Spreader pattern studies. ASAE paper number 001139.

Parish, R. L. and R. P. Bracy. 2000. Removal and collection of plastic mulch. ASAE paper number 001061.

Parish, R. L. 2001. Spreader damage to encapsulated controlled-release fertilizer granules. ASAE paper number 011124.

Other Meeting Proceedings

White, J. H. and R. L. Parish. 1973. One year's experience with the module builder in the rainbelt. Proceedings of Cotton Incorporated Seedcotton Handling and Storing Seminar, Phoenix, Arizona.

Parish, R. L. and K. R. Shelby. 1974. Design of a cotton brush harvester for four narrow rows. Proceedings of the 1974 Beltwide Cotton Production Research Conferences, Dallas, Texas.

Parish, R. L. 1978. Epoxy powder coating for lawn spreaders. AFP/SME Powder Coating Conference,

Cincinnati, Ohio.

Sverzut, C. B. and R. L. Parish. 1985. Electrical control for hydraulic cylinders on harvesters. Presented at the Annual Meeting, American Society of Sugarcane Technologists, Fort Walton Beach, Florida.

Parish, R. L. 1989. Improving uniformity with broadcast granular applicators. Paper number 118 presented at the 1989 annual meeting, Weed Science Society of America, Dallas, TX.

Porter, W. C. and R. L. Parish. 1993. Reducing nontarget losses of granular herbicides applied to container-grown ornamentals. Proceedings of the 1993 meeting of the Louisiana Plant Protection Association (abstract), p. 26.

Parish, R. L. and R. P. Bracy. 1997. Evaluation of seed covering devices and presswheels for direct seeding of mustard and cabbage. Proceedings of the Fifth National Symposium on Stand Establishment, Columbus, OH, June 1-4. pp. 187-193.

Parish, R. L. and W. C. Porter. 1997. Evaluation of a bulk planting system for low-cost seeding of cabbage. Proceedings of the Fifth National Symposium on Stand Establishment, Columbus, OH, June 1-4. pp. 180-186.

Parish, R. L., R. P. Bracy, and H. F. Morris, Jr. 1997. Broadcast vs. band applications of fertilizer on vegetable crops. Proceedings of the Fifth International Symposium on Fruit, Nut, and Vegetable Production Engineering, Davis, CA, Sept. 3-5.

Parish, R. L., R. P. Bracy, and R. M. Rosendale. 2002. Using plastic mulch for successive crops. Proceedings of the 30th National Agricultural Plastics Congress. San Diego, CA. p. 26. (abstract).

Parish, R. L. 2006. Reducing blow-over of container plants in nurseries. Proceedings of the 2005 SNA Research Conference 50:106-109.

Parish, R.L. 2006. Effective use of granular application equipment for turf. ASHS Annual Conference, New Orleans. July 30, 2006.

Presentations at Meetings

Parish, R. L. 1987. Uniform distribution of granular materials. Presented at the Annual Meeting of the Mississippi Agricultural Chemicals Council, Biloxi, MS, Aug. 6-8.

Parish, R. L. 1994. Tips for uniform broadcast application of granular fertilizer. American Farm Bureau Federation National Meeting, Ft. Lauderdale, FL.

Bracy, R. P. and R. L. Parish. 1994. Precision cultural practices for commercial vegetable production. American Farm Bureau Federation National Meeting, Ft. Lauderdale, FL.

Parish, R. L. 1995. A precision cultural system (PCS) for vegetable crops. An invited presentation at the 1995 North American Farmers' Direct Marketing Conference, Knoxville, TN, Feb. 2-4, 1995.

Parish, R. L. and W. C. Porter. 1996. Flame cultivation for controlling weeds. Presented in Workshop on Non-chemical Pest Management Techniques, ASHS Annual Meeting, Lexington, KY, Oct. 7-10.

Parish, R. L., R. P. Bracy, and W. C. Porter. 1996. High-speed cultivation of vegetable crops with finger-wheel cultivators. Southern Region, American Society for Horticultural Science, Greensboro, NC, Feb. 5.

Parish, R. L. and R. P. Bracy. 1997. Broadcast vs. band application of fertilizer for vegetable crops. 1997 Annual Meeting, Southern Region, American Society for Horticultural Science, Birmingham, AL,

Feb. 3.

Bracy, R. P. and R. L. Parish. 1997. Evaluation of presswheels and seed coverers for direct seeding of brassicas. 1997 Annual Meeting, Southern Region, American Society for Horticultural Science, Birmingham, AL, Feb. 3.

Parish, R. L. and R. P. Bracy. 1998. Metering nonuniform vegetable seeds. 1998 Annual Meeting, Southern Region, American Society for Horticultural Science, Little Rock, AR, Feb. 2.

Bracy, R. P. and R. L. Parish. 1998. Seeding rate affects turnip root production. 1998 Annual Meeting, Southern Region, American Society for Horticultural Science, Little Rock, AR, Feb. 2.

Parish, R. L. 1998. Evaluation of ergonomic nursery tools in Louisiana. Invited presentation at NIOSH Workshop on Agricultural Ergonomics, Cincinnati, OH, July 7.

Parish, R. L. 1999. An automated machine for removal of plastic mulch. 1999 Annual Meeting, Southern Region, ASHS, Memphis, TN, Feb. 1.

Parish, R. L. 1999. Precision tillage systems for vegetable production. AR-LA-MS Fruit and Vegetable Conference, Vicksburg, MS, Feb. 18.

Parish, R. L. and R. P. Bracy. 2000. Bed and row configuration studies. Presented at the Southern Region - ASHS Meeting, Lexington, KY, Jan. 31.

Parish, R. L. 2001. Workshop on calibration and use of spreaders and sprayers. An invited presentation at the University of Louisiana at Lafayette, Jan. 22.

Parish, R. L. and R. P. Bracy. 2001. Studies in plastic mulch for multiple cropping. Presented at the Southern Region - American Society for Horticultural Science, Ft. Worth, TX. Jan. 29.

Parish, R. L. and R. P. Bracy. 2002. Summer cover crops for a vegetable production system. SR-ASHS, Orlando, FL. Feb. 3.

Parish, R. L., R. P. Bracy, and R. M. Rosendale. 2002. Using plastic mulch for successive crops. 30th American Agricultural Plastics Congress, San Diego, CA. Feb. 24-25.

Parish, R. L. 2005. Vegetable seeders and cultivators. Invited presentation at the Great Plains Vegetable Conference, St. Joseph, MO, Jan. 7-8, 2005.

Parish, R. L. 2005. Evaluation of a slow-release fertilizer powder for landscape spraying. Southern Region of ASHS, Little Rock, AR, Feb. 7, 2005.

Parish, R. L. 2006. Container blow-over studies at the LSU AgCenter. Gulf States Horticultural Expo. Mobile, Feb. 1, 2006.

Parish, R. L. 2006. Preventing blow-over of nursery containers. Southern Region, ASHS. Orlando. Feb. 6, 2006.

Arkansas Farm Research

Parish, R. L. 1972. A narrow-row vertical-plate planter. *Arkansas Farm Research* 21(1):5.

Parish, R. L. and B. A. Waddle. 1972. A wide-bed cultural system for growing narrow-row cotton. *Arkansas Farm Research* 21(3):7.

Parish, R. L., S. M. Brister and D. E. Mermoud. 1973. Wide-bed, narrow-row cotton: preliminary research

results. *Arkansas Farm Research* 22(2):4.

Parish, R. L., S. M. Brister and D. E. Mermoud. 1973. Field evaluation of various guidance systems in cotton production. *Arkansas Farm Research* 22(6):7.

Parish, R. L. and K. R. Shelby. 1974. Developing a brush harvester for narrow-row cotton. *Arkansas Farm Research* 23(1):7.

Parish, R. L. and D. E. Mermoud. 1974. Evaluating wide-bed narrow-row culture in soybeans, grain sorghum and corn. *Arkansas Farm Research* 23(2):6.

Shelby, K. R. and R. L. Parish. 1974. An automatic control system for a cotton module builder. *Arkansas Farm Research* 23(3):3.

Parish, R. L. and K. R. Shelby. 1974. Effect of storing seedcotton on seed and lint quality. *Arkansas Farm Research* 23(4):9.

Louisiana Agriculture

Parish, R. L. and P. P. Chaney. 1985. New fertilizer spreader for home lawns evaluated. *Louisiana Agriculture* 28(4):23-24.

Parish, R. L., R. J. Constantin, W. L. Brown, and D. W. Wells. 1987. Automated fertilizer applicator developed for potting machines. *Louisiana Agriculture* 30(2):20-21.

Parish, R. L., P. P. Chaney, and F. E. Baker. 1988. Evaluation of sugarcane planters and planting systems. *Louisiana Agriculture* 31(2):10-12.

Parish, R. L., W. A. Mulkey, W. A. Meadows, P. P. Chaney, T. P. Talbot, and P. Hidalgo. 1988. Direct seeding of cole crops in Louisiana. *Louisiana Agriculture* 31(4):4-5, 23.

Porteus, S. C., R. L. Parish, and M. E. Wright. 1988. A mechanical transplanter for coastal marsh stabilization. *Louisiana Agriculture* 31(4):12-13, 24.

Bracy, R. P., R. L. Parish, P. E. Bergeron, and R. J. Constantin. 1991. High-density planting for maximizing yields in greens. *Louisiana Agriculture* 34(2):6-7.

Parish, R. L., D. W. Wells, and P. E. Bergeron. 1991. Evaluation of turfgrass reinforcement methods. *Louisiana Agriculture* 34(3):20-22.

Bracy, R. P., R. L. Parish, P. E. Bergeron, E. B. Moser, and R. J. Constantin. 1992. Precision-seeding cabbage to a stand. *Louisiana Agriculture* 35(4):5-7.

Bergeron, P. E., R. L. Parish, R. P. Bracy, R. A. Hinson, and J. E. Boudreaux. 1992. Economics of direct-seeding cabbage to stand using precision cultural systems. *Louisiana Agriculture* 35(4):7-9.

Parish, R. L. 1994. Precision guided cultivators reduce herbicides. *Louisiana Agriculture* 37(2):27.

Bracy, R. P. and R. L. Parish. 1994. Row number, not plant spacing, affects melon production. *Louisiana Agriculture* 37(4):29.

Parish, R. L., R. P. Bracy, and W. C. Porter. 1995. High-speed cultivation methods for commercial vegetable crops. *Louisiana Agriculture* 38(4):8-10.

Parish, R. L. and R. P. Bracy. 1995. Calibration of spoked-wheel fertilizer injectors. *Louisiana Agriculture* 38(4):10.

Parish, R. L., W. C. Porter, and C. M. LaBorde. 1995. Flame weed control for southern peas and lima beans. *Louisiana Agriculture* 38(4):23-24.

Bracy, R. P., R. L. Parish, and C. M. LaBorde. 1996. Harvest height affects yield and quality of greens crops. *Louisiana Agriculture* 39(3):26-27.

Porter, W. C. and R. L. Parish. 1996. Evaluation of a low-cost bulk seeding system for cabbage. *Louisiana Agriculture* 39(3):23.

Parish, R. L., R. P. Bracy, H. F. Morris, Jr. 1998. Broadcast fertilizer can give yields equal to banding. *Louisiana Agriculture* 41(3):27.

Bracy, R. P., R. L. Parish, and J. E. McCoy. 1999. Precision seeders for vegetables: How Precise are they? *Louisiana Agriculture* 42(1):25-26.

Parish, R. L. 2000. Automated machine helps remove plastic mulch. *Louisiana Agriculture* 43(1):11.

Parish, R. L. 2001. Fertilizer spreaders for home lawns. *Louisiana Agriculture* 44(2):23-24.

Bracy, R. P. and R. L. Parish. 2003. Precision vegetable seeders versus agronomic seeders. *Louisiana Agriculture* 46(1):19.

Bracy, R. P. and R. L. Parish. 2003. Recommended rates of Trifluralin affect direct-seeded cabbage stands. *Louisiana Agriculture* 46(1):20.

Hanna, H. Y., R. L. Parish, and R. P. Bracy. 2003. Reusing black polyethylene mulch saves money in vegetable business. *Louisiana Agriculture* 46(1):21-22.

Parish, R. L. 2005. Nursery Engineering, Part 1: Plant Blow-over. *Louisiana Agriculture* 48(2):21-22.

Parish, R. L. and W. C. Porter. 2005. Nursery Engineering, Part 2: Granular Herbicide Application. *Louisiana Agriculture* 48(2): 22.

American Lawn Applicator/Lawn & Landscape Maintenance

Parish, R. L. 1981. Selection, care and use of granular applicators. *American Lawn Applicator* 2(3):20-24 and 2(4):16-19.

Parish, R. L. 1985. A spreader innovation. *American Lawn Applicator* 6(7):52-54.

Parish, R. L. 1985. Spread it right. *American Lawn Applicator* 6(7):56-58.

Parish, R. L. 1986. Is Spreader Data Reliable? *American Lawn Applicator* 7(1):56-60.

Parish, R. L. 1986. Drop Spreader Complications. *American Lawn Applicator* 7(4):46-47.

Parish, R. L. 1986. Spreaders: theory vs. results. *American Lawn Applicator* 7(12):31-32, 34, 46.

Parish, R. L. 1987. Rotary spreader speed effects. *American Lawn Applicator* 8(6):35-36, 38.

Parish, R. L. 1987. Maintaining your spreader. *American Lawn Applicator* 8(7):32-33.

Parish, R. L. 1988. Correcting spreader pattern data. *American Lawn Applicator* 9(10):28-29.

Parish, R. L. 1988. An improved spreader pattern starts with the spreader. *American Lawn Applicator*

9(11):99-101.

Parish, R. L. 1990. Attaining uniform patterns: a constant challenge. *Lawn & Landscape Maintenance* 11(9):46-48.

Ornamental Outlook

Parish, R. L. 2005. Blocking blow-over. *Ornamental Outlook* 14(4):10,12.

Louisiana Vegetable News

Parish, R. L. 1987. The importance of precision in vegetable cultural systems. *Louisiana Vegetable News* 3(3):1-3.

Parish, R. L. and P. P. Chaney. 1988. Engineering plans available for Louisiana vegetable farmers. *Louisiana Vegetable News* 4(1):2-3.

Parish, R. L., W. A. Mulkey, and W. A. Meadows. 1988. Evaluation of cultural systems for broccoli in Louisiana. *Louisiana Vegetable News* 4(1):8-9.

Parish, R. L. 1988. Wide-bed cultural systems. *Louisiana Vegetable News* 4(2):4-5.

Parish, R. L., P. P. Chaney, and W. A. Mulkey. 1988. Cultural practices for growing pickling cucumbers in Louisiana. *Louisiana Vegetable News* 4(2):8-10.

Parish, R. L., P. P. Chaney, W. A. Mulkey, and T. P. Talbot. 1988. Direct-seeded bell peppers in Louisiana. *Louisiana Vegetable News* 4(3):10-11.

Parish, R. L., R. P. Bracy, W. A. Mulkey, and P. E. Bergeron. 1990. Cultural practices for cabbage in Louisiana. *Louisiana Vegetable News* 6(1):11-14.

Parish, R. L., R. P. Bracy, D. W. Wells, and P. E. Bergeron. 1990. Comparison of tiller/cultivators and sweep cultivators. *Louisiana Vegetable News* 6(1):14-16.

Parish, R. L., R. P. Bracy, and P. E. Bergeron. 1990. Cultural practices for greens in Louisiana. *Louisiana Vegetable News* 6(1):16-19.

Parish, R. L. and P. E. Bergeron. 1990. The potential for pendulum-action fertilizer spreaders in commercial vegetable crops. *Louisiana Vegetable News* 5(2):15-19.

Parish, R. L., P. E. Bergeron, D. W. Wells, H. F. Morris, and S. A. Bartkiewicz. 1990. Evaluating herbicide incorporation methods for bedded crops. *Louisiana Vegetable News* 5(2):19-23.

Parish, R. L., R. P. Bracy, and P. E. Bergeron. 1991. Comparison of belt and vacuum planters for vegetables. *Louisiana Vegetable News* 6(1):4-6.

Bergeron, P. E., R. L. Parish, R. P. Bracy, R. A. Hinson, and J. E. Boudreaux. 1991. Economics of direct seeding cabbage to a stand using precision cultural systems. *Louisiana Vegetable News* 6(2):9-10.

Edling, R. J., R. L. Parish, P. E. Bergeron, and R. P. Bracy. 1991. Multi-year buried drip irrigation trials. *Louisiana Vegetable News* 6(2):11-13.

Bracy, R. P., R. L. Parish, and P. E. Bergeron. 1991. Fertilizing Broccoli grown in multiple rows per bed. *Louisiana Vegetable News* 6(2):13-16.

Bracy, R. P., R. L. Parish, and P. E. Bergeron. 1992. Fertilizer placement in planting beds for vegetable production. *Louisiana Vegetable News* 7(1):10-13.

Bracy, R. P. and R. L. Parish. 1993. Plant population and nitrogen rate effects on yields of watermelon and cantaloupe. *Louisiana Vegetable News* 8(1):7-8.

Parish, R. L. and R. P. Bracy. 1993. A comparison of spool vs. pan-type bed shapers for vegetable crops. *Louisiana Vegetable News* 8(1):9-12.

Parish, R. L., R. P. Bracy, P. E. Bergeron, and R. J. Constantin. 1993. Modified cone guide wheels for cultivating the sides of planting beds. *Louisiana Vegetable News* 8(1):13-15.

The Louisiana Turfgrass Bulletin

Parish, R. L. 1987. Spread it right. *The Louisiana Turfgrass Bulletin* 24(2):6-8.

Parish, R. L. 1987. Drop spreader complications. *The Louisiana Turfgrass Bulletin* 24(3):1-3.

Parish, R. L. 1989. Be careful how you conduct spreader pattern tests. *The Louisiana Turfgrass Bulletin* 26(3):11-12.

Parish, R. L. 1992. An easy way to evaluate fertilizer spreader patterns. *Louisiana Turfgrass Association Bulletin* 29:9-10.

Parish, R. L. 1999. Safe mower operation. *Louisiana Turfgrass Bulletin* 36(2):5.

Parish, R. L. 2001. Fertilizer spreaders can damage encapsulated controlled-release fertilizer granules. *The Louisiana Turfgrass Bulletin* 38 (4):6-7.

Parish, R. L. 2004. The spreader setting dilemma – Part 1. *Louisiana Turfgrass Bulletin* 41(5):2-3.

Parish, R. L. 2004. The spreader setting dilemma – Part 2. *Louisiana Turfgrass Bulletin* 41(6):4-5.

Parish, R. L. 2005. Spreader setting recommendations. *Louisiana Turfgrass Bulletin* 42(1):7.

Parish, R. L. 2005. The effect of impeller drive gear ratio on rotary spreader patterns. *Louisiana Turfgrass Bulletin* 42(2):6-7

Parish, R. L. 2005. Rotary spreaders with pattern cut-off. *Louisiana Turfgrass Bulletin* 42(5):5.

Parish, R.L. 2006. Fire safety issue with professional turf mowers. *Louisiana Turfgrass Bulletin* 43(2):1-2.

News From the Hammond Research Station, etc.

Parish, R. L. and R. P. Bracy. 1993. Precision cultural practices for growing vegetables. *News from the Hammond Research Station* 1(1):5.

Parish, R. L. 1994. New equipment for cultural practices research. *News from the Hammond Research Station* 2(1):5-6.

Parish, R. L. and R. P. Bracy. 1994. Calibration of spoked-wheel injectors. *News from the Hammond Research Station* 2(2):2-3.

Parish, R. L. 1994. Technology for easier and safer spraying and sprayer cleanup. *News from the Citrus Research Station* 1(2):3.

Louisiana Nursery Notes

Parish, R. L. 1995. Which operating parameters are most important in using hand-cranked nursery applicators? *Louisiana Nursery Notes* 2(2):3-4.

Porter, W. C. and R. L. Parish. 1995. Documenting losses of granular herbicides applied to container ornamentals. *Louisiana Nursery Notes* 2(3):6.

LNLA Magazine

Parish, R. L. 2005. Reducing blow-over of container plants in nurseries. *LNLA Magazine*. Summer, 2005: 15,17.

***Vegetable Press* (Mississippi State University Extension Service)**

Parish, R. L. and R. P. Bracy. 2003. Precision cultural system for vegetable production. *Vegetable Press*, Mississippi State Extension Service 03(10):2-3.

Parish, R. L. and R. P. Bracy. 2004. Planter openers, coverers, and presswheels. *Vegetable Press*, Mississippi State Extension Service 04(1):1-2.

Parish, R. L. 2004. Mulch planters. *Vegetable Press*, Mississippi State Extension Service 04(4):1-2.

Parish, R. L. and R. P. Bracy. 2004. Removal of plastic mulch. *Vegetable Press*, Mississippi State Extension Service 04(8):3-4.

Parish, R. L. and R. P. Bracy. 2005. Precision vegetable seeders. *Vegetable Press,* Mississippi Extension Service 5(5):2-3.

Parish, R. L. 2005. Flame weed control. *Vegetable Press,* Mississippi Extension Service 5(9):5-6.

***Commercial Nursery & Landscape News* (LSU AgCenter)**

Parish, R. L. 2004. Sprayer calibration. *Commercial Nursery and Landscape News*. LSU AgCenter. Winter, 2003-2004. p. 5.

Other Trade Publications

Parish, R. L. 1981. Care and use of granular applicators. *Golf Course Management* 49(4):35-38.

Parish, R. L. 1986. Granular pattern analysis. *Agrichemical Age* 30(8):18-19.

Parish, R. L. 1986. How accurate are your spreaders? *Fertilizer Progress* 17(5):55-61.

Parish, R. L. 1987. Fundamentals of fertilizer spreaders. *Southern Turfgrass* 22(1):19-21.

Parish, R. L., P. P. Chaney, S. C. Porteus, and C. J. Gernon. 1987. Basic studies on Christmas tree cleaning. *American Christmas Tree Journal* 31(3):55-57.

Parish, R. L., R. J. Constantin, W. L. Brown, and D. W. Wells. 1988. Apply a shot of fertilizer automatically. *Greenhouse Manager* 6(11):65-70.

Gregory, J. and R. L. Parish. 1988. Sprayers and spreaders -- achieving high-caliber performance. *Landscape and Irrigation* 12(3):30-32, 44-47, 50, 52-53.

Porter, W. C. and R. L. Parish. 1995. Reducing nontarget losses of granular herbicide. *American*

Nurseryman 182(12):88-91.

Parish, R. L. 1996. Spreader selection, use, and calibration. In *The Landscape Management Handbook*, ed. W. E Knoop, p. 51-55. Duluth, MN: Advanstar Communications.

Parish, R. L. 2001. Spread the word. *Resource* (ASAE) 8(4):11-12.

Journal of Vegetable Crop Production

Parish, R. L. 1997. Conference Report: Fifth National Symposium on Stand Establishment. *Journal of Vegetable Crop Production* 3(2):103-104.

Parish, R. L. 1997. Profile: Richard L. Parish. *Journal of Vegetable Crop Production* 3(2):105-106.

Parish, R. L. 1998. Vegetable Conference Report: 5th International Symposium on Fruit, Nut, and Vegetable Production Engineering. *Journal of Vegetable Crop Production* 4(1):89-91.

Parish, R. L. 1998. Review of *Steel in the Field* by G. Bowman. *Journal of Vegetable Crop Production* 4(1):95-96.

Parish, R. L. 1999. Conference Report: American Society of Agricultural Engineers Annual Meeting, 1998. *Journal of Vegetable Crop Production* 4(2):89-90.

Parish, R. L. 1999. Conference Report: Vegetable Section, Southern Region, American Society for Horticultural Science, 1998. *Journal of Vegetable Crop Production* 4(2):91-92.

Parish, R. L. 1999. Conference Report - American Society of Agricultural Engineers Annual Meeting, July 13-15, 1998, Orlando, Florida. *Journal of Vegetable Crop Production* 4(2):89-90.

Parish, R. L. 1999. Conference Report - Vegetable Section, Southern Region, American Society for Horticultural Science, 1999. *Journal of Vegetable Crop Production* 5(1):91-93.

Parish, R. L. 1999. Conference Report: American Society of Agricultural Engineers Annual Meeting, July 18-21, 1999, Toronto, Canada. *Journal of Vegetable Crop Production* 5(2):79-81.

Parish, R. L. 2000. Conference Report: American Society of Agricultural Engineers Annual Meeting 2000. *Journal of Vegetable Crop Production* 6(2):97-99.

Southeast Louisiana Nursery Notes

Parish, R. L. 2005. Update on nursery container blow-down project**.** *Southeast Louisiana Nursery Notes*, July 2005, p. 3.

Popular National Magazines

Parish, P. A. and R. L. Parish. 1988. How to choose a lawn spreader. *Popular Mechanics* 165(5):155-156.

Parish, R.L. 2006. Cuttin' up – mower choices. Acreage 5(4):28-29.

Extension Publications

Parish, R. L. and D. Rester. 1986. Using SPREADER.EZ to evaluate fertilizer spreader patterns. Extension Bulletin, Louisiana Cooperative Extension Service.

Parish, R. L. 2004. Selecting and using lawn and garden tractors. Louisiana Cooperative Extension Service Bulletin # 2900.

Parish, R. L. 2004. Compact tractor selection, use, and safety. Louisiana Cooperative Extension Service Bulletin # 2906.

Parish, R. L. 2004. Lawn, garden, and grounds maintenance equipment – a resource for Master Gardeners. Illustrated resource module on CD (113 articles).

Parish, R. L. 2004. Zero turning radius (ZTR) mowers – selection, use, maintenance, and safety. Louisiana Cooperative Extension Service Bulletin #2911.

Parish, R. L. 2005. Implements for compact tractors – selection, use, maintenance, and safety. Louisiana Cooperative Extension Service Bulletin #2917.

Louisiana Agricultural Experiment Station Publications

Mulkey, W. A. and R. L. Parish. 1992. Sweet potato foundation seed program for Louisiana. LAES Circular No. 132.

Parish, R. L., R. P. Bracy, and P. E. Bergeron. 1992. Precision cultural practices for commercial vegetable production. LAES Bulletin No. 836.

Parish, R. L., R. P. Bracy, and W. C. Porter. 1995. Leafy Greens Research at the Hammond Research Station 1988-1994. LAES Bulletin No. 848.

Rollason, S. H., R. P. Bracy, R. L. Parish, and J. R. Tarver. 1997. Precision Cultural System. Video; Louisiana Agricultural Experiment Station.

Parish, R. L., J. Brooks, C. Gautreaux, W. Futrell. 1998. Hammond Research Station Mulch Collector. Video; Louisiana Agricultural Experiment Station.

Parish, R. L. 1999. Granular spreaders; selection, calibration, testing, and use. Louisiana Agricultural Experiment Station Bulletin No. 866.

LSU AgCenter Website - LouisianaLawnandGarden.org/Parish/htm

Over 190 articles on lawn, garden, and grounds maintenance equipment and commercial vegetable equipment. Many of the articles have been rewritten and used as news releases from the LSU AgCenter.

Engineering Plans

Chaney, P. P. and R. L. Parish. 1987. Engineering plans for building a bed shaper. Distributed through Louisiana Cooperative Extension Service.

Chaney, P. P. and R. L. Parish. 1987. Engineering plans for building a 12-row, side-dumping harvest aid. Distributed through Louisiana Cooperative Extension Service.

Chaney, P. P. and R. L. Parish. 1988. Engineering plans for building an insecticide duster for sweet potato crates. Distributed through Louisiana Cooperative Extension Service.

Parish, R. L. 1988. Engineering plans for building a side-dumping wagon box for harvesting vegetables. Distributed through Louisiana Cooperative Extension Service.

Chaney, P. P. and R. L. Parish. 1988. Engineering plans for building a directed shielded sprayer for vegetables. Distributed through Louisiana Cooperative Extension Service.

Misc. Publications

Parish, R. L., R. L. Hutchinson, and D. B. Reynolds. 1995. Weed control for conservation-tillage systems for cotton. *Conservation-Tillage Systems for Cotton: A Review of Research and Demonstration Results from Across the Cotton Belt*, Arkansas Agricultural Experiment Station, Special Report 169.

Dissertation

Parish, R. L. 1970. An experimental study and simulation of an automatic steering system for a hydrostatic vehicle. Unpublished PhD dissertation, University of Missouri Library, Columbia, Missouri.

Patents

Parish, R. L. and J. D. Amerine. 1979. Manually operated applicator having a plurality of rotors for dispensing particulate material. U.S. Patent 4,153,184.

Parish, R. L. and J. D. Amerine. 1979. Combined fertilizer and pesticide applicator for plants. U.S. Patent Des. 254,591.

Parish, R. L. and J. D. Amerine. 1980. Applicator for particulate material. Canadian Patent 1,085,792.

Computer Programs

Parish, R. L., 1986. SPREADER.EZ version 1.1 (a computer program for spreader pattern analysis). Distributed nationally by the Louisiana Cooperative Extension Service.

Parish, R. L., 1988. SPREADER.EZ version 2.0 (a computer program for spreader pattern analysis). Distributed nationally by the Louisiana Cooperative Extension Service.